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The Travel Letters of H.C. Ørsted

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Abstract

Hans Christian Ørsted was an international traveller, whose eight foreign journeys lasted for periods ranging from a single week to more than three years. Fortunately, his experiences and candid observations were recorded in letters home, often in the form of a journal intended for family and friends. While portions of these letters were published in heavily abridged form by his daughter Mathilde, they are presented in their entirety for the first time in the present edition. Taken as a whole, these documents provide a remarkably coherent chronicle of the personal and professional development of one of Denmark's greatest scientists. In addition to providing insight regarding the events and attitudes which led to Ørsted's discovery of electromagnetism in 1820, his travel letters offer a reminder of the high level of international mobility and collaboration that characterised the physical sciences during the first half of the nineteenth century.

The Travel Letters of H.C. Ørsted

Edited and traslated by

Karen Jelved og Andrew D. Jackson

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Introduction

Every century or so, Denmark has been blessed with a scientific genius, Hans Christian Ørsted and Niels Bohr to name but two, whose contributions have fundamentally changed our understanding of the laws of nature. Their intellectual impact is beyond question, and the practical consequences of their insights have materially altered our world. Bohr's quantum revolution has been directly responsible for our microscopic understanding of matter. It has provided the knowledge essential for the age of electronics and information technology in which we now live. Ørsted's contributions to the electromagnetic revolution of the nineteenth century were of equal importance. Although unquestionably dedicated to the advancement of fundamental knowledge, Ørsted was mindful of the dual role of the natural sciences long before his discovery of electromagnetism in 1820. In his *First Introduction to General Physics* (1811), Ørsted states that

> *[I]nsight is good in itself,* and no external justification is needed for wanting to acquire it. Science, then, must be studied for its own sake, as the vital manifestation of our innermost being, as the acknowledgement of the Divine. The fact that this also produces the most glorious fruits in the lower sphere is a consequence of that rational harmony which inspires everything. ... [T]he utility of natural science is twofold, in that it both increases our powers and multiplies the means for their exercise.[1]

Given this dedication to fundamental questions coupled with a clear awareness of their practical consequences, Ørsted was very much a man of his times and, as such, an interesting subject for study.

Fortunately, Ørsted considered himself to be a man of letters to the extent that he could describe his scientific production as his "literary career"[2]. His scientific prose is florid in comparison with that

1. KM III, p. 160 and JJK, p. 287.
2. KM II, p. 356 and JJK p. 546.

of many of his contemporaries. With philosophical and religious references and even bits of poetry, his writing would certainly not meet with the approval of contemporary desk editors. However, this freedom of style was accompanied by a freedom of content. As a result, Ørsted is often prepared to provide us with his personal views about science and clues to the sources of his own scientific inspiration. In 1803, some seventeen years before his discovery of electromagnetism, Ørsted stated his fundamental belief that

> [t]he constituent principles of heat, which are important in alkalis and acids, in electricity, and in light, are also the principles of magnetism, and thus we would have the unity of all the forces which act together to govern the entire universe ... for do friction and impact not produce both heat and electricity, and are dynamics and mechanics not thereby perfectly intertwined? ... Our physics, therefore, will no longer be a collection of fragments on motion, on heat, on air, on light, on electricity, on magnetism, and who knows what else, but with one system we shall embrace the entire world[3]

The indebtedness to Immanuel Kant's ideas as expressed in his *Metaphysische Anfangsgründe der Naturwissenschaft* is apparent. If there are two fundamental forces (of attraction and repulsion), and if all the other forces of nature are derived from them, we should expect to find relations and interactions between them. The search for these connections provided a primary motivation for Ørsted's science. It led him to consider such apparently disparate topics as acoustic figures and the compressibility of fluids. It shaped his conviction that there must be a connection between electricity and magnetism.

Ørsted's writings provide substantial indications of his scientific world view, but they do not really address the issue of the process by which it was formed. In this regard, we believe that the present edition of *The Travel Letters of H. C. Ørsted* can provide useful insight. Ørsted took eight foreign journeys, some of them of considerable duration. His experiences were thoroughly documented in his letters home. These letters frequently took the form of a journal to

3. *Materials for a Chemistry of the Nineteenth Century* (1803), KM I, pp. 209-10 and JJK p. 164.

family and friends and, as such, largely represent one-way communication. Taken as a whole, these letters provide fascinating documentation of Ørsted's development both as a scientist and as a person. Some of the letters reproduced here are contained in an earlier two-volume edition of *Letters to and from H. C. Ørsted*, edited by his daughter, Mathilde, and published in 1870. This earlier edition is flawed by a number of inaccuracies in transcription and, more seriously, by extremely harsh abridgements. While some of the deletions, often crossed out in pencil in the original letters, could be justified as "uninteresting", others seem to have been motivated by a desire to maintain the dignity of the author. Our intention in the present edition is to provide an accurate rendering of all Ørsted's travel letters in the collection of the Royal Library in Copenhagen without deletions – both in Danish and in English.

The Journeys: While the letters speak eloquently for themselves, Ørsted's journeys merit some words of comment. His first journey, primarily to Germany and to Paris, from August 1801 to December 1803 may well be the most interesting. Support for this journey in the form of a stipend from the Cappel Fund was arranged by his mentor, Professor Johan Manthey, who was a member of the board of the Fund. The stated purpose was for Ørsted to learn more about technical chemistry, especially porcelain manufacture and the brewing of beer[4]. The young Ørsted devoured a wealth of new impressions – of society and the arts as well as of scientific matters. Armed with innocent enthusiasm and a portable version of the newly invented voltaic cell (1800), he was warmly received in both social and academic circles. The most important of his new German acquaintances was undoubtedly Johann Wilhelm Ritter, a young physicist of considerable ability[5]. Ritter was, like Ørsted, a disciple of Kant's *Naturphilosophie*. Together, they studied the works of the Hungarian chemist

4. Manthey was soon to assume the leadership of the Royal Porcelain factory and was a member of a public commission for the improvement of brewing techniques.

5. In 1802 Ritter used ingenious chemical techniques to confirm Herschel's 1801 discovery (by physical means) of the existence of infrared light and immediately used the same techniques to discover ultraviolet light. In the same year Ritter constructed the first dry cell, and in 1803 he constructed the first storage battery.

Jacob Joseph Winterl. Winterl had taken the Kantian polarities to their extreme and claimed to have discovered two substances, "andronia" and "thelyke", which were said to represent the physical embodiment of the principles of acidity and alkalinity, respectively. Ørsted's uncritical and continuing support for Winterl's irreproducible experimental discoveries would create difficulties for him in Paris and later in Copenhagen. There was also time for scientific work during Ørsted's extended stay in Germany using borrowed laboratory facilities, and he prepared his *Materials for a Chemistry of the Nineteenth Century*, a piece of Winterl advocacy, during this period.

Ørsted finally arrived in Paris in December 1802. Although proficient in German from childhood, his first task was to learn French. His routine in Paris differed considerably from that in Germany. His time there was generally spent more passively by attending lectures and exploring the rich social and artistic opportunities. Above all, he had to adjust to the rationalism of French scientific culture, which placed a high value on experimental results and none whatsoever on *Naturphilosophie*. Ørsted used his newly-acquired language skills to promote the discoveries of Ritter in learned Parisian circles and, as a consequence, was invited by Jean Baptiste Biot to nominate Ritter for a Napoleonic prize for an important galvanic discovery. Unfortunately, Ritter chose to ignore his undeniable scientific contributions and instead insisted on nomination for two more questionable achievements. The first of these was his "discovery" that the earth has two electric poles. The second was the observation that a "compass needle", constructed with one half of zinc and the other of silver, would point toward magnetic north. Ørsted had such a needle produced in the hope of reproducing his friend's results[6]. While Ørsted won praise for his advocacy of a friend, he also gained a reputation for having more enthusiasm than judgment. Ritter received no prize. News of Ørsted's role in the Ritter fiasco was quick to reach Copenhagen and probably contributed to the fact that he was unable to secure a university appointment immediately.

For most of this journey, Ørsted reported his activities and impressions in some detail in the form of a journal intended for family

6. See p. 185.

and friends and for later reference. This journal ends abruptly on October 6, 1803. In a letter to Manthey, Ørsted writes:

> ... I have not had the peace of mind needed to draft it because of a letter that my brother has writtenabout S.P. You must surely know its contents and will hear my response from him.[7]

For the remainder of this journey, the reports of his activities were sent directly to Manthey. Since Sophie Probtshein ("S.P.") is not generally recognised in Ørsted scholarship, some words of explanation are in order[8]. Sophie was employed in Manthey's household. With the blessing and active encouragement of Manthey, she became Ørsted's fiancee before the start of his journey. Prior to October 1803, Ørsted's travel journal was sent to Sophie[9] along with more personal letters (since lost) intended for her alone. Letters to Manthey contain passages indicating Ørsted's concern regarding the length of his journey and the resulting delays in their marriage[10]. Ørsted met one of Sophie's relations in Freiburg in June 1802[11], and it is not unreasonable to speculate that the length of Ørsted's journey was discussed. The reasons for the termination of their engagement are naturally unclear. While the length of Ørsted's journey was surely a contributing factor, it is also the case that Sophie was neither liked nor accepted by the Ørsted circle of family and friends. Sophie remained unmarried and survived her brother, who died in 1818, in impoverished circumstances. It is seems likely that Ørsted's carrier would have developed quite differently if he had married Sophie Probsthein with the financial responsibilities of home and family forcing him to the security of a more utilitarian carrier in technical chemistry. It is also clear that all references to Sophie and to this engagement have been deleted from Mathilde Ørsted's edi-

7. See p. 208.

8. For a more complete account of the following, see Dan Ch. Christensen, *Naturens tankelæser*, Museum Tusculanums Forlag (2009).

9. See pp. 34 and 195.

10. For example, see pp. 92 and p. 188 where he writes "... do I dare to keep Sophie waiting so long with empty promises of my return?"

11. See p. 85.

tion of the letters, and that the name "Probsthein" has been crossed out vigorously in the original documents. Since Mathilde's editorial decisions may have been based in part on a desire to preserve her father's reputation, the need for the present unexpurgated edition would appear to be more compelling.

Ørsted second foreign journey took him to Germany and France during the period from May 1812 until February 1813. Ørsted's career was developing nicely. He had been appointed professor[12] of physics at the University of Copenhagen (in the philosophical faculty) in 1806 and been elected to membership in the Royal Danish Academy of Sciences and Letters. Professionally, his scientific studies now included a thorough investigation of acoustic figures[13], which had received broad and positive reception in Copenhagen intellectual circles. The purpose of these experiments was not least to support the Kantian dynamic view that all natural forces were related by demonstrating that the mechanical oscillations of plates could produce electrical effects:

> I believed that I would also be able to discover electrical phenomena in the production of the acoustic figures and therefore chose *semen lycopodii* to strew on the glass plate instead of sand, in the hope that the dust would adhere to the positively charged places and would easily fall of the negatively charged ones.[14]

With growing influence and confidence Ørsted was encouraged to seek royal support for the establishment of a high school for the experimental natural sciences patterned largely on what he had seen in Germany and France. While this attempt was unsuccessful, he was ultimately granted leave from his professorship with full pay and travel expenses with the express purpose of investigating how advances in technical chemistry might contribute to economic progress and well-being in Denmark. The recipient of his travel letters on this occasion was his sister-in-law Sophie Ørsted (*née* Oeh-

12. Ørsted was appointed to the inferior position of *professor extraordinarius*.

13. KM II, pp. 11-34 and JJK pp. 264-81.

14. See KM I, pp. 261 and JJK, p. 180.

lenschläger), with whom he enjoyed a warm and confidential relationship. His letters to Sophie are largely both light-hearted and flirtatious, but Sophie's responses were infrequent. This was not a matter of indifference or indolence, but rather one of indisposition; both Sophie and Anders Sandøe were ill during much of this period. The commission to study technical chemistry was largely ignored as much of his time in Berlin was spent completing his book *View of the Chemical Laws of Nature Obtained Through Recent Discoveries*[15]. Evidently he was well aware of his truancy and admonished Sophie that "it would be wiser not to talk about this in Copenhagen until the book is published"[16]. The result of his labours was nothing less than a recasting of chemistry in a Kantian framework. Upon his arrival in Paris, he undertook the task of preparing a French edition of this work[17]. This version was somewhat reworked to provide background information regarding *Naturphilosophie*, unnecessary for German readers, and to express some extreme opinions (e.g. regarding Kant's two fundamental forces) more moderately in order to avoid alienating the French. As Ørsted later remarked:

> I have observed on many occasions that it is almost impossible to make my theory comprehensible to the French without also presenting them with certain features of *Naturphilosophie*. If I am often tempted to declare myself against *Naturphilosophie* in Germany when I see the misuse of it there, in France I find myself all the more encouraged to defend it; or rather I feel a fundamental difference in the scientific way of thinking, which I would not have imagined to be so large if I had not so often felt its living presence.[18]

During this journey, Ørsted also learned from Anders about N. F. S. Grundtvig's *Kort Begreb af Verdens Krønike i Sammenhæng*[19]. It represented a frontal attack by a Christian fundamentalist on the academic elite in general and on natural science in particular. Grundtvig re-

15. KM II, pp. 35-169 and JJK pp. 310-92.

16. See p. 229-30.

17. *Recherches sur l'identité des forces chimiques et électriques*, J. G. Dentu, Paris 1813. See also KM II, pp. 171-77.

18. See p. 292.

19. *Brief Summary of the World Chronicle in Context* (1812).

garded the belief that God was to be found revealed in nature as heresy; God was to be found in the Bible. Anders regretted that he was unable to take up the fight. Hans Christian replied:

> It really pains me that Grundvig is to escape unscathed. ... This man's enmity to reason has long inclined me to attack him some time. ... He is a poisonous weed in our literature that should be pulled up by the roots. If he should ever obtain any power, he would be one of the most vile and evil tormentors.[20]

While this reaction may seem extreme, it should be weighed in the light of Grundtvig's own words such as his charge against physics that "the denial of God was its first word, sorcery and alchemy its dearest achievements"[21]. Hans Christian met Grundtvig's challenge upon his return in a public exchange of letters that won him considerable praise in intellectual circles.

Ørsted's third journey covered the period from November 1822 to August 1823 and took him to Germany, France, and England. His life had been busy since his previous trip. In 1814 he married Inger Birgitte Ballum, called Gitte, and the financial demands of a growing family forced him to assume a heavy teaching burden in his new role as *professor ordinarius* (1817). At roughly the same time (1815) he was elected Secretary of the Danish Royal Society and expended both time and effort in what he regarded as its much-needed revitalisation. There was little time available for science. His primary chemical contribution during this period was the extraction of the alkaloid piperine from black pepper (1820). Ørsted's lifelong interest in the compression of fluids (i.e. both gases and liquids) began during this period with the invention of his piezometer[22]. It was Ørsted's belief that demonstration of the fact that the volume of a body was *strictly* inversely proportional to the pressure for all pres-

20. See pp. 238.

21. See K. A. Pedersen, *Om Troen og dens Indflydelse på Jordelivet eller om Kirke og Stat*, Grundtvig Studier 1995, p. 41.

22. By applying equal internal and external pressures to the container, Ørsted could measure the compression of the fluid without errors introduced by changes in the volume of the container.

sures would provide evidence against the existence of atoms and in support of Kant's dynamism[23].

Ørsted's major scientific achievement in this period was, of course, the discovery of electromagnetism. The discovery was announced on June 21, 1820 in a privately printed Latin article sent to learned societies and selected scientists throughout Europe. One of these copies was sent to Sir Humphry Davy. With the aid of his assistant Michael Faraday, he soon succeeded in verifying Ørsted's results. Davy, who had been elected President of the Royal Society in 1820, immediately proposed Ørsted for membership and succeeded in securing the Copley Medal for him in the same year. Faraday was equally active in defending Ørsted against claims that he was lucky, or that others had made the discovery first. The Prussian Academy of Sciences in Berlin worked almost as quickly as the English and awarded Ørsted membership in December 1820. The list of French recipients of Ørsted's article was perhaps the most impressive and included Ampère, Arago, Biot, Fresnel, Laplace, and Savart among others. Events proceeded rapidly. Arago quickly verified Ørsted's results experimentally and demonstrated them convincingly to a sceptical audience in Paris on September 11. Two weeks later Ampère demonstrated the interaction between two current-carrying wires. Finally, Biot and Savart showed how to describe the direction and magnitude of the magnetic field produced by a long current-carrying wire. This result was soon generalised by Laplace into the form now commonly known as the Biot-Savart Law. This entire outburst of French scientific creativity, triggered by Ørsted's discovery, took only a few months. In spite of this, Ørsted was not offered membership in the *Académie Royale des Sciences* until 1823. Given the demonstrated scientific abilities and technical facilities of the French, one might well ask why they did not discover electromagnetism themselves. The answer to this question was provided by Ampère himself in a letter to Jacques Roux-Bordier written in February 1821: Coulomb had assured his colleagues that there was no interaction between the electric and magnetic fluids, and this as-

23. Ørsted found that this was true within experimental uncertainty for the gas and liquid phases separately. He also observed that this was clearly *not* the case at the gas-liquid phase transition but failed to appreciate the significance of this fact.

sertion was regard as fact. Convinced that there was nothing to find, the French did not look. Ørsted, on the other hand, was equally convinced that Kant's two fundamental forces (i.e. attraction and repulsion) ensured that there *must* be a connection between electricity and magnetism. He looked, and he found it.

Ørsted was now an international scientific figure, and his third foreign journey was nothing less than a triumphal procession. Although his busy schedule made it impossible for him to leave immediately, he did find the time to pose for Eckerberg's famous portrait of him with the apparatus for his three primary interests (i.e. acoustic figures, the compression of fluids, and electromagnetism). Gitte did not think it a good likeness. The journey commenced in November 1822, and he was accompanied by the architect Michael Bindesbøll most of the time. His correspondent for this journey and for all future journeys was Gitte. The content and tone of his letters reflect the fact that she was neither academically trained nor intellectually inclined. He travelled first to Berlin, where he rekindled old friendships, and then to Jena and Munich. He encountered little scientific stimulation: "... but from Berlin to Munich, ... where I have passed through three university towns, I have not found one decent chemist or experimental physicist"[24]. The stay in Jena did provide one of the journey's high points – Ørsted's meeting with Goethe. Given Ørsted's respect for Goethe's literary genius, their meeting could have been reduced to an abject pilgrimage; Goethe's amateur interest in science and Ørsted's new status as a major scientist permitted it to be more of a meeting of equals. Ørsted's awe is nevertheless apparent. The two had a discussion on Goethe's *Farbenlehre*, which was more an exchange of views than a meeting of minds. As Ørsted put it, Goethe expressed "the opinion that we would come closer to agreement on this subject if only we had more time together"[25]. Ørsted was doubtful.

His stay in Paris was scientifically more rewarding and not lacking in "decent" scientists. In addition to the French recipients of his 1820 article, Ørsted met Babinet, Georges and Frédéric Cuvier, Fourier,

24. See p. 273-74.

25. See p. 263. This sounds suspiciously like Niels Bohr's well-known critical remark that "we agree more than you think."

and Gay-Lussac. These meetings were largely unsuccessful. The French were rightly convinced of the validity of the theoretical descriptions of electromagnetism developed by Ampère, Biot and Savart and had little sympathy for Ørsted's own theories. He formed a particularly low opinion of Ampère: "He is a very inept debater and understands neither how to grasp properly the reasons of others nor to present his own; nevertheless, he has a profound mind."[26]. It is not unlikely that Ørsted's limited abilities in mathematics contributed to this impression[27]. In spite of scientific disagreements, Ørsted was more than satisfied with the warmth of his reception in Paris. He even found the time to perform experiments on thermoelectricity with Joseph Fourier[28], which forced him to extend his stay in Paris. Ørsted and Fourier carried out a thorough and systematic investigation of the effect discovered by Thomas Johann Seebeck (1821). Their results are summarised in a letter from Ørsted to Prince Christian[29].

Following this delay, Ørsted was now prepared for his first trip to England[30]. This visit could have been a matter of some concern. Ørsted had experienced the horrors of the British bombardment of Copenhagen in 1807 and had seen the entire first printing of his *First Introduction to General Physics* go up in flames. That there is no evidence of this in his letters may be a consequence of the immediate and positive recognition of his electromagnetic discovery by British scientists in general and Sir Humphry Davy in particular. Davy received him with uncharacteristic warmth; he and Faraday soon demonstrated their most recent experiments. Much of Ørsted's

26. See p. 288.

27. Ørsted was not alone in this. Writing to Ampère on November 17, 1825, Michael Faraday noted that "[w]ith regard to your theory it so soon becomes mathematical that it quickly gets beyond my reach".

28. Although Fourier is now regarded primarily as a mathematician, he was also a physicist. He was the first to understand that the temperature of the earth was determined by a balance between incoming solar energy and outgoing blackbody radiation (*chaleur obscure*) and argued (1824) that atmospheric gases could increase the temperature of the Earth. Thus, he should be credited with the discovery of the greenhouse effect.

29. See p. 311, KM II, pp. 272-82 and JJK pp. 470-77.

30. Bindesbøll did not accompany him on this part of the journey.

time in London was occupied by tourist activities which gave him ample opportunity to marvel at the changes brought about by science and new technology, not least by steam engines in factories and steamships[31]. Of Ørsted's many new scientific acquaintances, the most notable were Thomas Young, John Herschel, Charles Wheatstone, and Charles Babbage. After almost two months in London, Ørsted took the steamship to Edinburgh, where his host and guide was David Brewster. Brewster, who was the editor of *The Edinburgh Encyclopaedia*, convinced Ørsted to contribute an article on electromagnetism[32]. Brewster was also involved in one of the few scientific investigations Ørsted performed during this trip. According to Brewster[33], Ørsted performed "a considerable number" of measurements of the Earth's magnetic field "while travelling in England in 1823"[34]. One of these, "at which we [Brewster] had the pleasure of assisting was performed in Edinburgh on the 4th of July, 1823"[35]. This measurement was not, however, the highlight of the day since it followed Ørsted's meeting with Sir Walter Scott. The respect bordering on awe which Ørsted had shown Goethe appears again with Scott. After a return journey to London with visits in several big cities, Ørsted had an unpleasant channel crossing to Calais, where he spent his birthday alone while waiting for Bindesbøll. Together they returned to Denmark.

Following this third journey, Ørsted's career took a new turn with societal obligations taking precedence over his scientific investigations. The time he allotted to science was not unproductive and allowed him to perform supplemental electromagnetic experiments,

31. The first public steam railway, constructed by George Stephenson, did not open until 1825.

32. See p. 345. Since the encyclopaedia was alphabetically arranged and was published between 1808 and 1830, the resulting article was entitled *Thermo-Electricity*. Ørsted availed himself of the opportunity to describe his own role in the discovery of electromagnetism. See KM II, pp. 351-98 and JJK pp. 542-82.

33. As stated in the American edition of *The Edinburgh Encyclopaedia* (1832) pub. by Joseph Parker, Philadelphia, vol. XVIII, p. 151.

34. Ørsted was also involved in similar measurements elsewhere on this journey. See p. 253.

35. See p. 344-45.

improvements to his measurements of the compressibility of fluids, and the isolation of metallic aluminium. The bulk of his efforts were devoted elsewhere. Ørsted had been impressed by the activities of the Royal Institution (founded 1799) and the London Institution (founded 1806) in promoting the diffusion of useful knowledge through general public lectures and courses for craftsmen. Having seen the benefits of science and technology in England, Ørsted decided to create a Danish Society for the Advancement of Science (*Selskabet for Naturlærens Udbredelse* (SNU), founded 1824) to be supported by private subscription. Significant financial support was not forthcoming, and Ørsted was forced to carry the additional burden of SNU lectures five evenings each week in addition to his normal university duties. Similarly, Ørsted was central in the establishment of the publicly financed Polytechnic High School (*Den Polytekniske Læreanstalt*, founded 1829) under the University of Copenhagen. As originally proposed by Georg Frederik Ursin (1797-1849), the intention had been to create a school for the practical training of artisans. Ørsted modified this idea and instead created an academic institution for higher technical education with an emphasis on basic science and complete with entrance examinations. His view that the applications of science belonged to the "lower sphere"[36] had not changed. As Director of the Polytechnic High School, Ørsted was obliged to assume new responsibilities as teacher and administrator. In addition to these formal responsibilities, he was frequently asked to issue white papers on a variety of topics, ranging from questions related to asphalt-covered water mains to the advisability of allowing bakers to add copper sulphate to bread flour. Some of these ad hoc tasks had far-reaching public consequences. His common sense advice regarding the granting of patents later served as the foundation for Danish patent law. It is no wonder that there was little time left for science.

Although there is little correspondence, Ørsted's fourth foreign journey to Altona in May 1827 is of some significance[37]. The purpose of this journey was to discuss proposals for wide-scale measure-

36. See p. vii.

37. The absence of correspondence is due to the briefness of the journey and to the fact that Inger Birgitte and their daughter Karen joined him for the latter part of his stay.

ments of the declination, inclination and intensity of the Earth's magnetic field with colleagues with the goal of locating the magnetic north pole of the Earth. Ørsted's host was his friend, Heinrich Christian Schumacher, the astronomical observer at the Round Tower, who was allowed to live in Altona because of his geodesic measurements of Schleswig and because of his desire to be close to his teacher Gauss in Göttingen. They were joined by Gauss, John Herschel, Alexander von Humboldt (who had useful contacts in South America), and Christopher Hansteen, whose early measurements of terrestrial magnetism (1821) had focussed scientific attention on the subject. This meeting laid the groundwork for the Göttingen Magnetic Union, which was formally established in 1834 by Gauss and his assistant Wilhelm Weber with the encouragement of Humboldt. Although Ørsted was interested in the notion of the Earth as an electromagnet, he had no particular expertise in terrestrial magnetism. His participation in this meeting was rather to ensure Danish participation in an important international project.

Ørsted's fifth journey in September 1828 took him again to Germany, where he attended the annual meeting of the Society of German Natural Scientists and Physicians (*Gesellschaft Deutscher Naturforscher und Ärzte*) in Berlin. The Society was founded by the biologist Lorenz Oken in 1822 and, in the spirit of *Naturphilosophie*, was intended to promote a dialogue between practitioners of empirical science and those who favoured an a priori speculative approach. The founders of GDNÄ believed that these two views of science should not and could not be separated. The meetings contained both specialised section meetings and more general open plenum sessions. Their style was friendly and international. Talks were delivered extemporaneously and, in Ørsted's case at least, without notes. His talk was a defence of his own theory of electromagnetism against Ampère's, and he was not satisfied with it[38].

Ørsted's sixth journey took him to Stockholm in July 1842 in order to participate in the third annual meeting of Scandinavian scientists. The initiative for this series of meetings was taken by the Norwegian physician C. A. Egeberg who, in collaboration with Swedish

38. See p. 372.

scientists from Lund, announced a meeting to take place in Gothenburg in 1839. The style of the meeting was clearly inspired by GDNÄ and by the British Association for the Advancement of Science (founded in 1831). The meetings were informal in the sense that talks were to be given extemporaneously. The meeting involved social as well as scientific activities with the aim of encouraging an active dialogue between scientists. However, the purpose of these meetings was more practical than philosophical. It was felt that the scientific achievements of Denmark, Norway and Sweden were undervalued by European colleagues as a consequence of their size and relative isolation, and that this situation could be changed by promoting a common Scandinavian presence which would be large enough to demand recognition. Ørsted was a strong supporter of the idea from its inception. He took the opportunity in Gothenburg to indulge a long-standing interest in language by speaking about the benefits that the scientific languages in the three Scandinavian countries could derive from one another. He also participated in all subsequent gatherings, including the meeting in Stockholm in 1842. Although the initial meeting had not been strongly supported, attendance in 1842 had risen to more than 400 Scandinavian scientists and foreign participants. On this occasion, Ørsted's contribution dealt with beauty as perceived by the natural scientist[39]. It was an issue which had interested him for some time, and on this occasion he was satisfied with the result. His letters from this journey do not reveal that King Carl XIV Johan awarded him the Order of the Polar Star.

Soon after his return, Ørsted was once again honoured by King Friedrich Wilhelm IV of Prussia with admission to the order *Pour le Mérite* for contributions to science and the arts. This award was made at the suggestion of Alexander von Humboldt, who had recently (1842) been appointed Chancellor of the civil list of this order, and who knew Ørsted from their participation in the Magnetic Union. Christian VIII of Denmark was greatly pleased by this development and suggested that Ørsted travel to Berlin at state expense to thank

39. A relatively dry summary of this talk can be found in KM II, pp. 506-11 and in JJK pp. 599-602. A more detailed popular version of the same material can be found in Ørsted's *Samlede og Efterladte Skrifter*, vol. 3, pp. 155-206.

the Prussian King personally. Thus, Ørsted's seventh journey (and his fifth to Berlin) in July and August 1843 was initiated by royal command and had a dominantly ceremonial and social character. Two audiences with the King, who had heard and praised Ørsted's talk in Berlin (1828) while Crown Prince, allowed Ørsted to express his thanks[40], but no "proper conversation" ensued. Ørsted renewed old acquaintances at the many private parties arranged in his honour. The journey gave him his first opportunity to travel by rail.

Ørsted's final foreign journey to France, England and Germany from July to September 1846 was equally ceremonial but of rather more interest. He had been invited by John Herschel to be the guest of honour at the annual meeting of the British Association for the Advancement of Science, which was to be held in Southampton in September. Ørsted was no longer young and felt (quite unnecessarily as it turned out) the need of companionship. He was thus accompanied by Professor and Mrs. Forchhammer and by Mathilde, his youngest daughter. Except for a few letters from Paris, family correspondence was relegated to Mathilde[41]. Their month-long stay in Paris was dictated by a much-delayed audience with King Louis Philippe. While waiting, Ørsted's days were filled with visits to scientific colleagues, instrument makers, factories. His detailed description of the manufacture of water mains was more than idle curiosity; in 1847 Ørsted dealt unofficially with a patent application for asphalt-covered water mains similar to those seen in Paris[42]. The long-awaited audience with Louis Phillipe was not a success. The King had been briefed for a meeting with Anders Sandøe and had nothing of substance to say to his scientist brother[43]. The party left for London two days later.

40. See p. 390.

41. We have therefore decided to include Ørsted's personal travel journal in the present edition. Although not sent home in instalments, this journal has a structure similar to those from earlier travels and offers more detailed insight regarding his scientific and technical activities.

42. As early as 1823, Ørsted had regarded the technical evaluation of possible replacements for the unsanitary wooden water and sewage mains in Copenhagen as "one of my official duties". (See p. 336.) Opposition to such improvements on largely economic grounds, including that of Anders Sandøe, prevented action until the cholera epidemic in 1853, which killed 4000 people in Copenhagen.

43. See p. 457.

The two weeks before the start of the BAAS meeting were filled with the usual round of scientific and technical visits. Water supply still held Ørsted's attention. Meteorological and magnetic measurements took him to the observatories at Kew and Greenwich. There was a chance meeting with William Rowan Hamilton at Greenwich that revealed this great mathematical physicist as a reader of Ørsted's chemical writings. On August 30th, Ørsted had a breakfast meeting with Charles Babbage[44], who explained the new ideas that had caused him to abandon his first difference engine in spite of the £17,000 provided for its construction in favour of his second difference engine[45]. Ørsted received a piece of the first engine as a souvenir. The BAAS meeting in Southampton contained little of scientific interest. Ørsted enjoyed his position as a distinguished guest but again discovered that meeting royalty, in this case Prince Albert, does not often lead to significant conversations. Upon his return to London, Ørsted had a brief meeting with Faraday, who showed him his most recent experiments on diamagnetism. It is surprising that Ørsted and Faraday, whose scientific careers had so much in common, had so little personal contact.

Ørsted then travelled on to Kiel for the annual meeting of GDNÄ, arriving on September 22. In this instance, the atmosphere of the meeting is of greater interest than its contents. His reception in England had provided a noble demonstration of the brotherhood of science in which ideas were exchanged openly, and in which personal and professional recognition of accomplishment were unaffected by national or political concerns. The meeting in Kiel proved that the bonds of this brotherhood were not so strong as he would have hoped. While Ørsted's private encounters were generally warm, public statements from the German hosts were more politically charged and less welcoming. This was particularly true at the conference banquet, where the after-dinner remarks were xenophobic and explicitly anti-Danish[46]. As the senior German-speaking foreigner participant,

44. See pp. 464-65.

45. The second difference engine was not built during Babbage's lifetime. A model was constructed according to Babbage's design in 1991 and functioned precisely as predicted, calculating mathematical functions to 31-place accuracy.

46. Dan Ch. Christensen has suggested that this reaction was not simply an indica-

Ørsted felt obliged to respond forcefully. His lifetime of travels thus ended with the regretful observation that "science is no longer a shield against insults encouraged by political blindness"[47].

Danish transcription and editorial practice: Except as noted, the source materials for this edition are original holograph letters contained in the Ørsted Collection of the Danish Royal Library[48]. The letters were written in Gothic script with quill pen and are not always easy to decipher. The transcriber's spirits sink when Ørsted writes "In order to save postage I shall henceforth write as small as here"[49]. The present Danish transcription is intended to reproduce Ørsted's letters as faithfully as possible, and the letters have generally been reproduced as written. To the extent possible, the letters are presented in a manner that respects their original layout. New paragraphs (but not new lines) are indicated. The original punctuation has been retained in the Danish transcription. Following Ørsted, the Danish transcription distinguishes between Roman and Gothic script. Ørsted wrote primarily in Gothic script, which is reproduced as ordinary text. Roman script, used unsystematically to emphasise names and foreign words, is given in *italics*. Ørsted's frequent use of underlining for emphasis is given in **semi-boldface**.

The letters are shown in a manner that readily allows the reader to distinguish the original text from editorial comments. Although the retention of Ørsted's spellings does not usually pose significant problems in spite of their inaccuracies and inconsistencies, errors in the names of people and places can sometimes be troublesome. Where spelling errors, missing words or the like can cause confusion, corrections have been inserted in the text. Such corrections and other brief editorial comments are denoted by square brackets, [...]. More extensive editorial comments are given in the Danish transcription as separate text notes (pp. 491-99). Doubtful readings

tion of generic nationalism. In his Open Letter of July 8, 1846, King Christian VIII announced that the Act of Succession to the Danish throne would apply in Schleswig and parts of Holstein. This was viewed in Germany as an initial Danish step towards the annexation of these two duchies and aroused considerable anger.

47. See p. 486.

48. The relevant catalogue numbers are ØS 1-2, 80, 83, and 94.

49. See p. 136.

of individual words are indicated by [?] immediately following the word in question. Damage to the letters, almost certainly intentional, is noted either in square brackets or in the text notes.

Additions and deletions to the text present special problems when dealing with Ørsted's letters. These changes fall into three categories. Ørsted made remarkably few deletions at the time of writing. These, which can largely be described as inconsequential "false starts", are commonly found when he addresses scientific or technical matters and are not noted unless of particular interest. His additions take the form of over-line insertions or marginal notes. When their position in the text is marked unambiguously, they are placed accordingly with a brief editorial comment in square brackets or a text note. When their position is unclear, they are placed as a separate paragraph with an explanatory editorial comment. Ørsted also made later changes to his original letters, some as late as 1847[50]. These include the attempts to expunge traces of Sophie Probsthein in the travel journal from his first trip through vigourous deletions in ink[51] and rewriting[52]. Significant alternations are noted. Finally, there are deletions and additions presumably made by Mathilde Ørsted on the original letters in connection with her 1870 edition of her father's letters. Her editorial policy would appear to have been two-fold. Her edition is free of "uninteresting" portions of the letters, and passages that might be regarded as damaging to her father's reputation have been expurgated. These changes, usually made lightly with a soft pencil, coincide with the passages included and omitted from her edition. In many cases, the use of pencil and the handwriting makes it possible to identify these changes with reasonable certainty. Again, significant alterations are indicated. Examples of these various forms of additions and deletions can be found in the reproduction of selected pages of Ørsted's letters appended here. We note that Mathilde Ørsted's edition is heavily abridged. She includes roughly one-half of the journal from Ørsted's first journey and less than one-third of the journal from his last. Thus, although the Danish transcription includes some page ref-

50. See p. 314.

51. See above.

52. See p. 82 where the phrase "I thought of you, my Sophie" has been deleted and replaced by "I thought of you, my brother".

erences to the 1870 edition, we have not attempted to provide a detailed compilation of passages retained and omitted.

English translation: The English translation is also intended to be faithful to the content and tone of the original. Ørsted employs a variety of prose styles in these letters including relatively formal academic writing when writing to Manthey and sometimes also to Anders Sandøe, telegraphic notes in sentence fragments to describe daily business, and breathless run-on sentences kept alive by frequent semicolons when carried away by enthusiasm. We have retained style and word order to the extent possible, and with a few exceptions, we have not attempted to repair infelicities of language or to impose an artificially homogeneous tone. The few instances of verse have been translated respecting rhyme and meter. As in the Danish version, Ørsted's idiosyncratic spellings of proper nouns have been retained with minimal editorial emendations (in square brackets) in the interests of clarity. Considerable care has been taken with word choice. Every effort has been made to avoid English words and expressions which were not in use when the original letters were written. For example, when Ørsted writes about "de Stene som ere nedfaldne fra Himmelen" in 1802, we have avoided the tempting alternatives of "meteorites" (first usage 1823) and "aerolites" (first usage 1810) in favour of the literal rendering "stones which have fallen from the sky"[53]. We admit, however, one intentional anachronism. We have systematically rendered the Danish word "Physiker" as "physicist" throughout even though it did not exist in English until its introduction by William Whewell in 1840[54]. Alternatives seemed unnecessarily clumsy. (The English word "physics" is considerably older and creates no difficulties.) The word "scientist", proposed by Whewell in 1833 and published in 1834[55] has been rendered as "naturalist" before this date.

53. See p. 140.

54. W. Whewell, *The Philosophy of the Inductive Sciences* (1840), p. lxxi.

55. Writing anonymously in the London *Quarterly Review* (1834), Whewell remarked that "scientists" had been suggested as a suitable collective term, "but this was not generally palatable."

As noted above, Ørsted uses several forms of emphasis, including underlining and Roman letters, to supplement his usual Gothic script. In the English translation, Ørsted's underlinings are again given in **semi-boldface**. His distinction between Gothic and Roman letters has been ignored, and standard English practices have been adopted for the use of italics. Although we have chosen not to include the more detailed comments of the Danish transcription in the English translation, significant additions and deletions are noted either in square brackets or in footnotes. Similarly, the layout of the English text does not follow Ørsted's own. For readers wishing this additional information, we note that some care has been taken to maintain common pagination of both versions. It is thus relatively easy for English readers to access this information in the Danish text.

Index of names: The number of people who Ørsted met on his journeys and mentions in his letters is overwhelming; the task of identifying them was challenging. Fortunately, the primary resources for the identification of well-known people, *Dansk biografisk Lexikon*, *Allgemeine Deutsche Biographie*, and the *Oxford Dictionary of National Biography*, are available on the internet as well as in more ponderous printed form. For less famous individuals and for those who are ambiguously identified or whose names have been misspelled or misheard[56], more imaginative searches were necessary. The resulting index of names contains more than 1300 entries, and we have succeeded in providing positive identification of more than one thousand of them. The compilation of this index proved to be both fascinating and rewarding with oblique references leading to unexpectedly interesting figures. Consider the following two examples. Initially, Ørsted's comment that "I could do nothing more than repeat what Schulz has said in his interesting journey to Paris"[57] did not seem promising. An internet search on "Schulz + Paris" yielded more than two million hits. With more careful searching, the Schulz in question proved to be

56. When Ørsted says that he visited the Finlaysche Garten while on a drive in the vicinity of Dresden, it requires some luck to associate this with the Scottish Lord Findlater. See p. 414.

57. See p. 185.

Joachim Christian Friedrich Schulz (1762-98), an actor and novelist who spent six months in 1789 in Paris, where he witnessed early events of the French Revolution. His impartial descriptions of the Revolution and of life in Paris first appeared in instalments in *der Teutsche Merkur* (1790) and were published in book form in 1791. All of these instalments are available on-line, and they are fascinating to read. While attending the BAAS meeting in 1846, Ørsted notes that "Owen, Buckland, Lyell, Buller and others spoke"[58].

While Owen, Buckland, and Lyell were readily identified, Buller proved to be difficult. In fact, "Buller" proved to be John Bullar (1778-1864). Bullar, an educator and a vocal opponent of slavery, was deeply committed to the development of Southampton with a desire to create "energetic alliances with science and literature"[59]. Bullar participated in the 1846 BAAS meeting, and John Herschel was his house guest. As Ørsted noted, Bullar spoke at the meeting on the importance of including Christian beliefs in rational science. As a particular service to the BAAS participants, he prepared a new edition of his *Hints to Assist the Enquiries of Visitors*. Since similar biographical sketches for each entry would have increased the length of the present work substantially, we have limited ourselves to providing keywords that should be sufficient for unique identification.

Literature

R. M. Brain, R. S. Cohen, and O. Knudsen, eds., *Hans Christian Ørsted and the Romantic Legacy in Science*, Boston Studies in the Philosophy of Science, vol. 241, 2007. This volume of conference proceedings presents a broad spectrum of current Ørsted scholarship.

Dan Ch. Christensen, *Naturens tankelæser: En biografi om Hans Christian Ørsted*, Copenhagen, 2009. This Danish edition is the only complete biography of Ørsted.

K. Jelved, A. D. Jackson, and O. Knudsen, eds. and trans., *Selected Scientific Works of Hans Christian Ørsted*, Princeton, 1998. (Abbreviated as JJK.) This volume contains English translations of a broad selection of Ørsted's most important scientific works.

Kirstine Meyer, ed., *H. C. Ørsteds Videnskabelige Værker*, vols. I–III, Co-

58. See p. 476.

59. John Bullar, *Hints to Assist the Enquiries of Visitors* (1846), p. 14.

penhagen, 1920. (Abbreviated as KM.) Meyer's edition of Ørsted's scientific works, prepared in connection with the centenary of his discovery of electromagnetism, represents a complete edition of his scientific works in their original language (i.e., Danish, German, French, English and Latin). Volume I contains an introductory English essay entitled *The Scientific Life and Works of H. C. Ørsted*, and volume III contains a Danish description of his contributions to Danish society entitled *H. C. Ørsteds Arbejdsliv i det danske Samfund*. Although not always representative of current Ørsted scholarship, both essays remain useful.

Mathilde Ørsted, ed., *Breve fra og til Hans Christian Ørsted*, vols. I and II, Copenhagen, 1870. (Abbreviated as MØ.) As noted above, this Danish collection of Ørsted's travel letters is heavily abridged and selectively edited. It remains a document of independent merit, and it provides an interesting contrast to the present edition.

Acknowledgements

We have enjoyed the assistance and support of a number of people throughout the preparation of this edition. Jesper Düring Jørgensen and Dan Ch. Christensen have been helpful sparring partners in deciphering Ørsted's texts. Dan was a valuable source of biographical information, and we benefited greatly from a pre-publication copy of his Ørsted biography. Help in solving a variety of language problems was generously provided by Maja Mølholm (German), Lars Vilhelm Slot Eskesen (Latin), and Henrik Bolt-Jørgensen (Greek), who also identified the source of the elusive Grundtvig quotation in this introduction. We also thank Marianne Jelved, who helped us in finding the expert assistance that we required. Finally, we thank Marita Akhøj Nielsen for her sound advice and for her enthusiastic support.

The cover image is a photograph of a bust of Ørsted by Mathilius Schack Elo (1887-1948). The work was commissioned by *Dansk Aluminium Industri A/S* and is appropriately cast in an aluminium alloy. The bust is signed "Elo 1937". Private collection.

Karen Jelved
Andrew D. Jackson
Copenhagen, January 2011

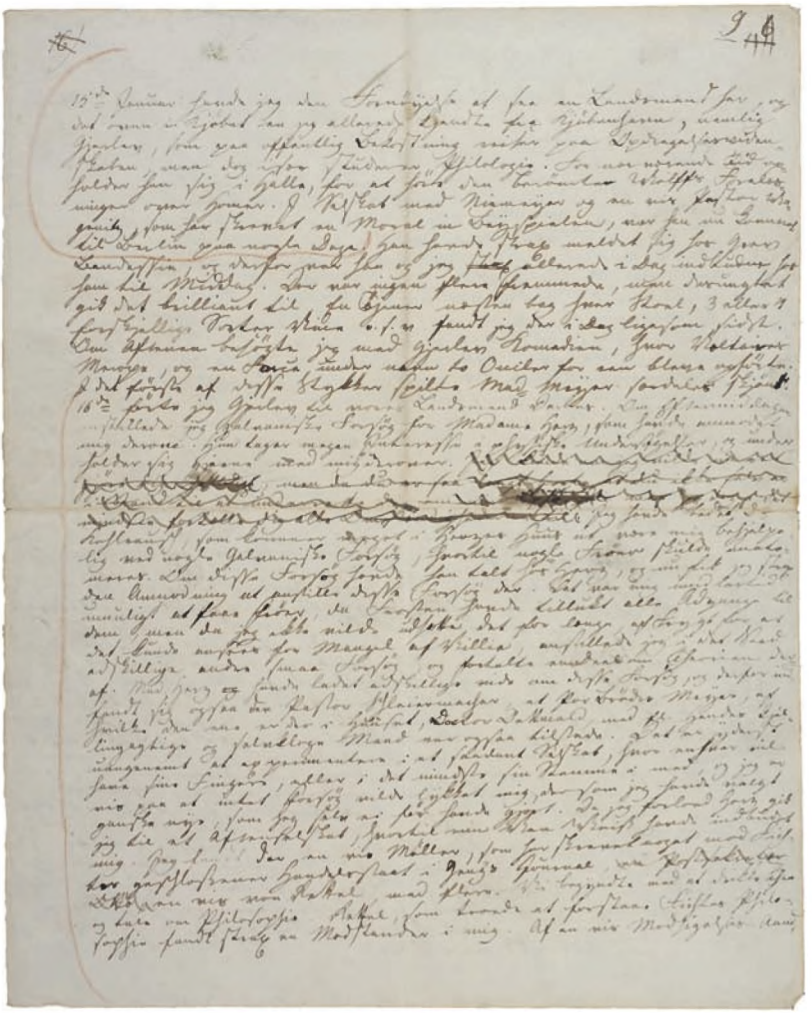

Plate 1: Generally, passages marked in reddish-brown pencil have been included in MØ's edition, and exceptions will be noted. Here, the sentence in lines 19–22, which reads "If I wanted to, I could make you quite [jealous], but since you are so far away that you are unable to apprise yourself of my conduct, I must at least tell you all the circumstances", has been crossed out in ink, presumably by HCØ, in an attempt to remove all references to his engagement to Sophie Probsthein. (See p. 37.)

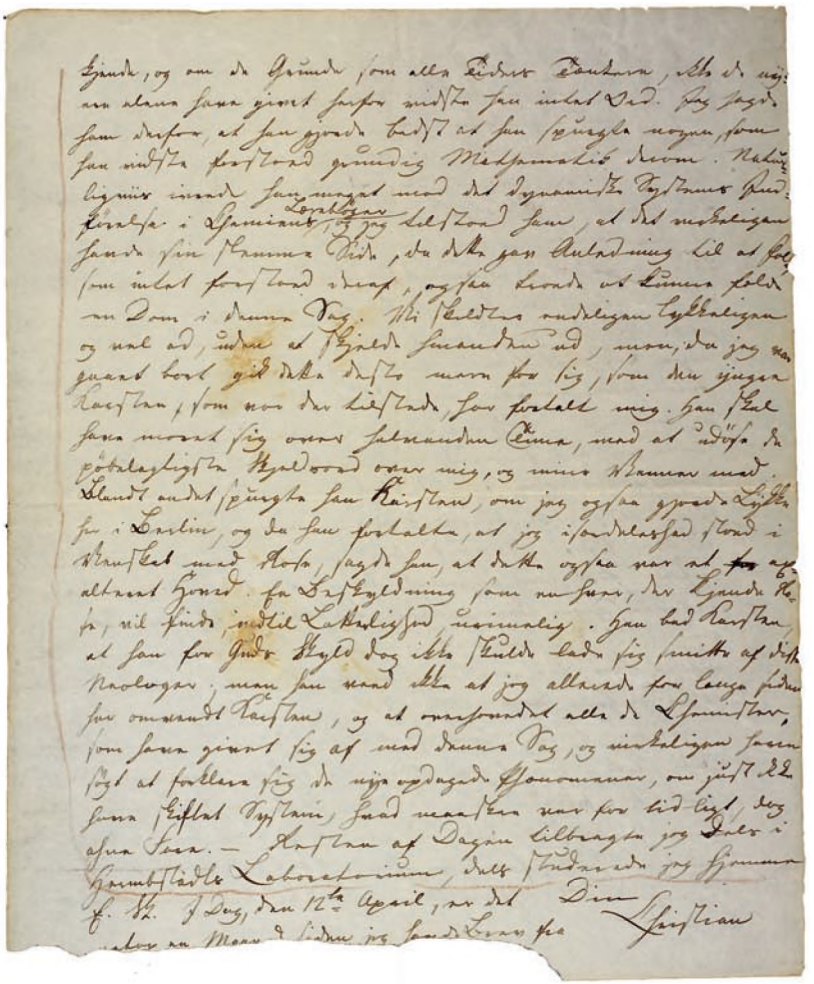

Plate 2: A strip has been torn from the bottom of this page. The final sentence reads "P. S. Today, April 12th, it is exactly one month since I received a letter from". (See p. 65.) From context, it is likely that the name "Sophie" has been removed.

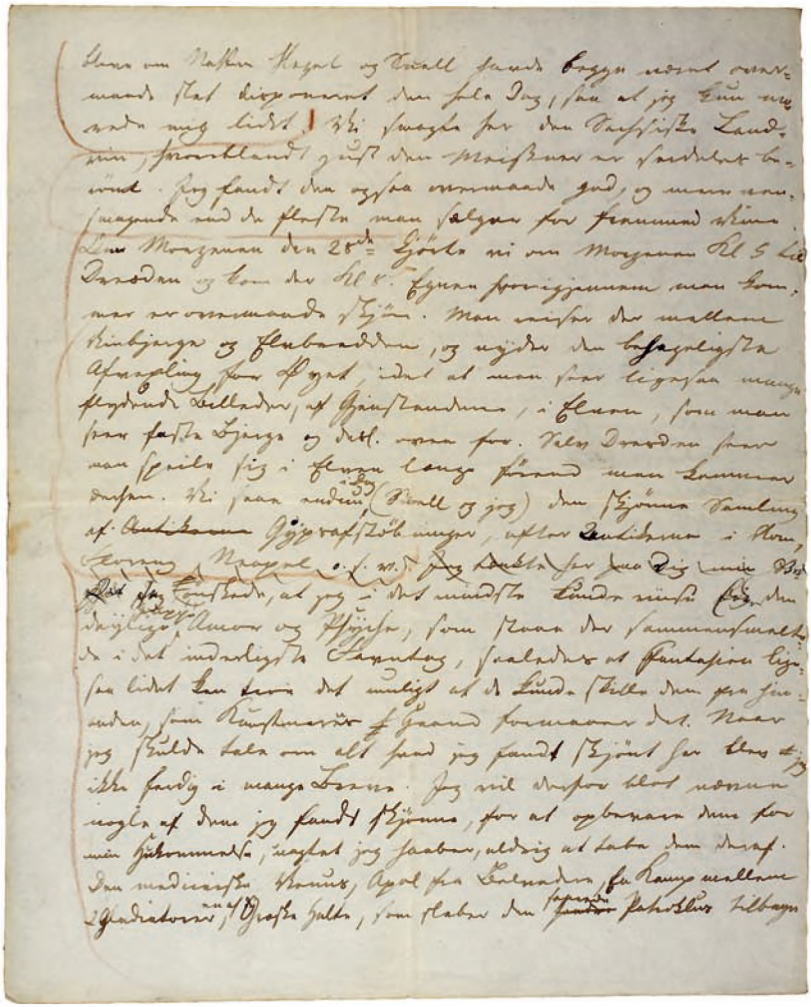

Plate 3: The final word in the sentence in line 17 reading "I thought of you, my Sophie" has been altered to "Brother". (See p. 81-82.) In spite of this change, the sentence has been crossed out in ink and is not included in MØ's edition.

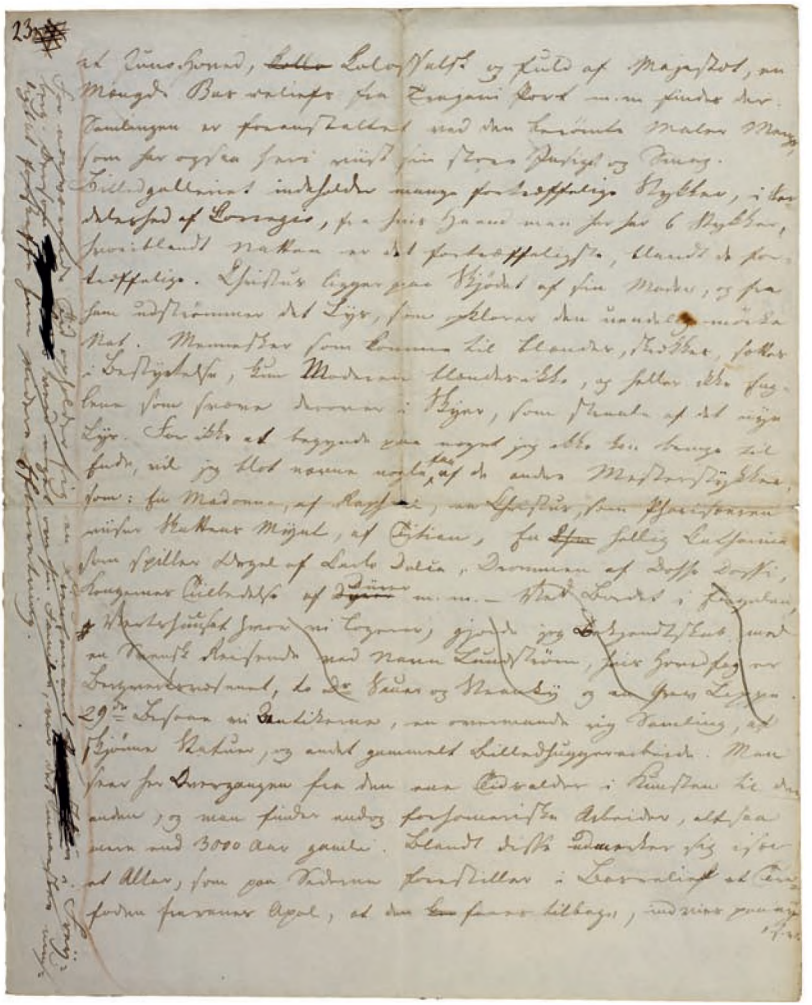

Plate 4: The sentence in lines 18–21, which has been crossed out in ink, is not included in MØ's edition. The marginal note, "At the moment a Lieutenant [the name "Probsthein" has been crossed out] is staying in Freyberg. As [name crossed out] knows something about his family, it might be possible to get him some additional information", shows another example of the elimination of references to the name of Probsthein. (See p. 85, footnote.)

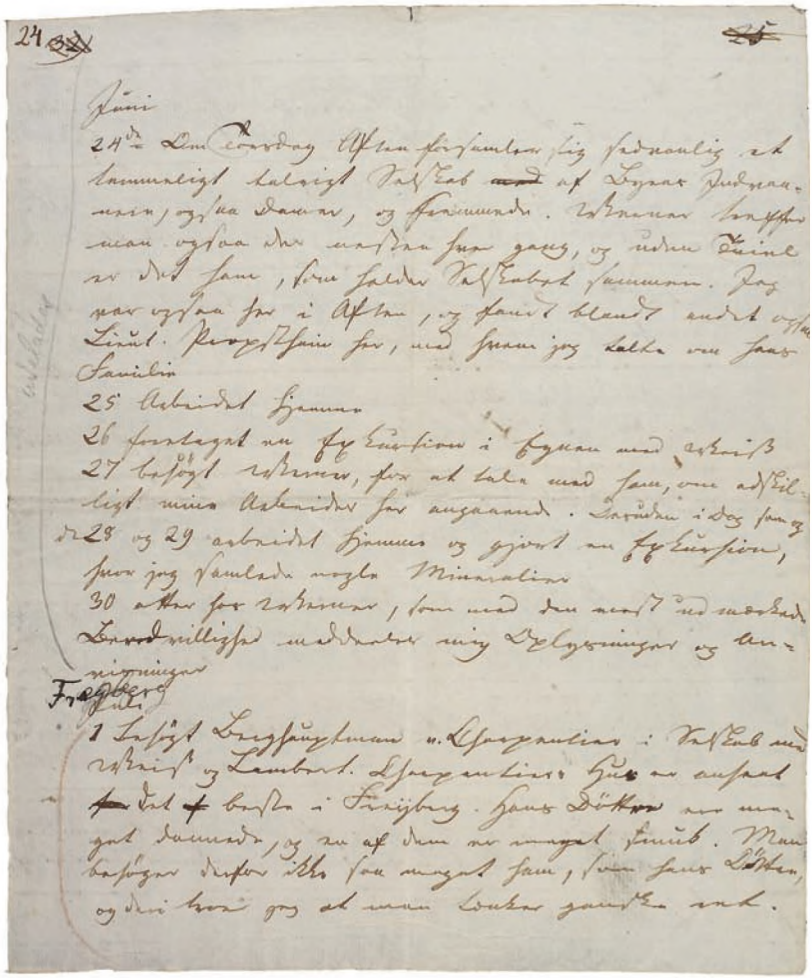

Plate 5: Passages in bluish-grey pencil marked "to be deleted" are not in MØ's edition. The word "Freyberg" is a later addition, presumably by MØ. (See p. 95.)

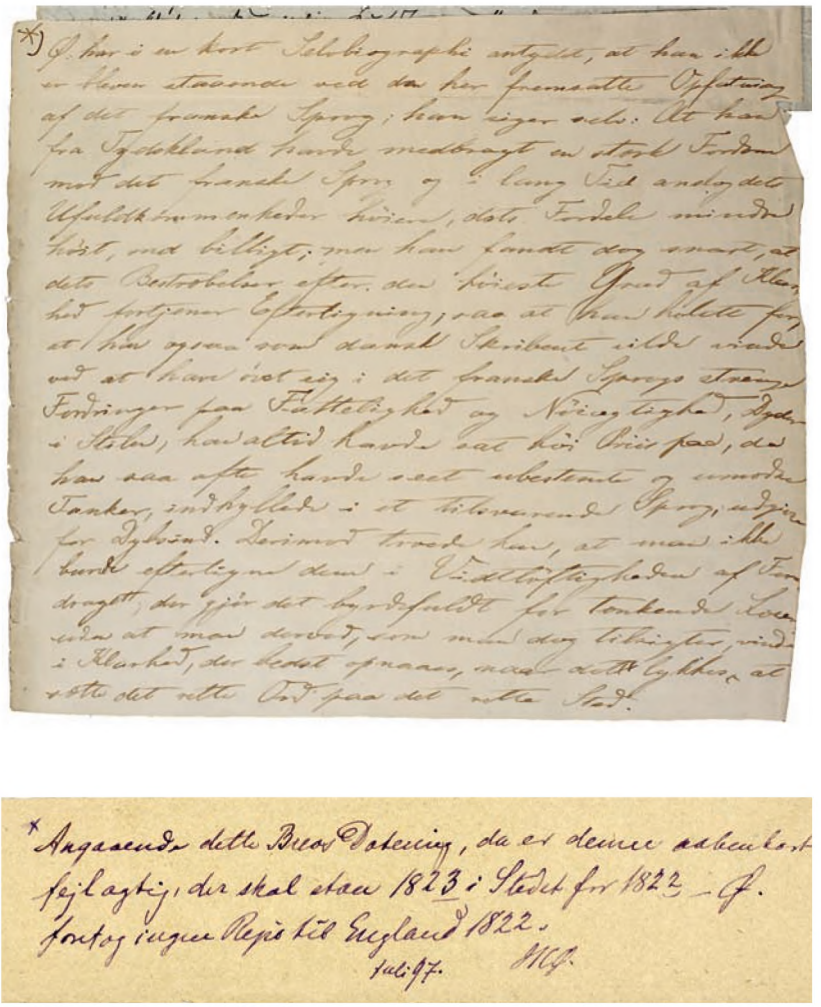

Plate 6: The upper example (see p. 176, footnote) is definitely MØ's handwriting. The lower (see p. 314, footnote), signed "HCØ", is clearly not in his hand and may have been written by MØ.

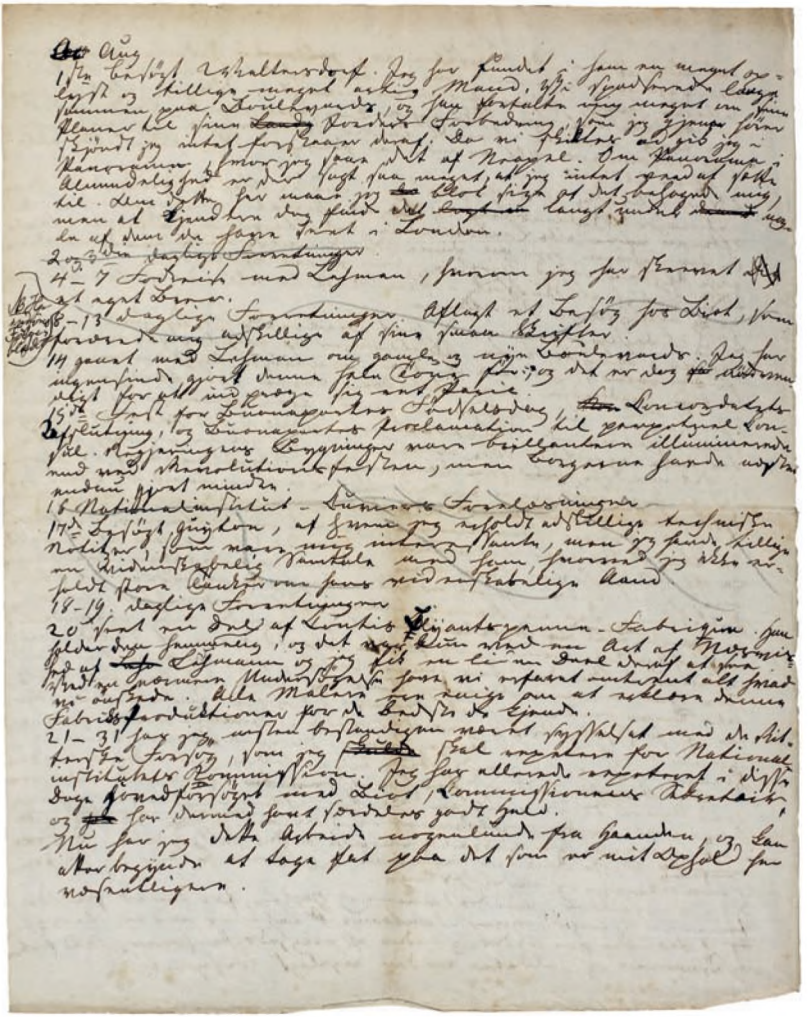

Plate 7: The marginal note, which has been added later, reads "NB. The following pages are to be inserted here". (See p. 194.) Other passages crossed out are not included in MØ's edition.

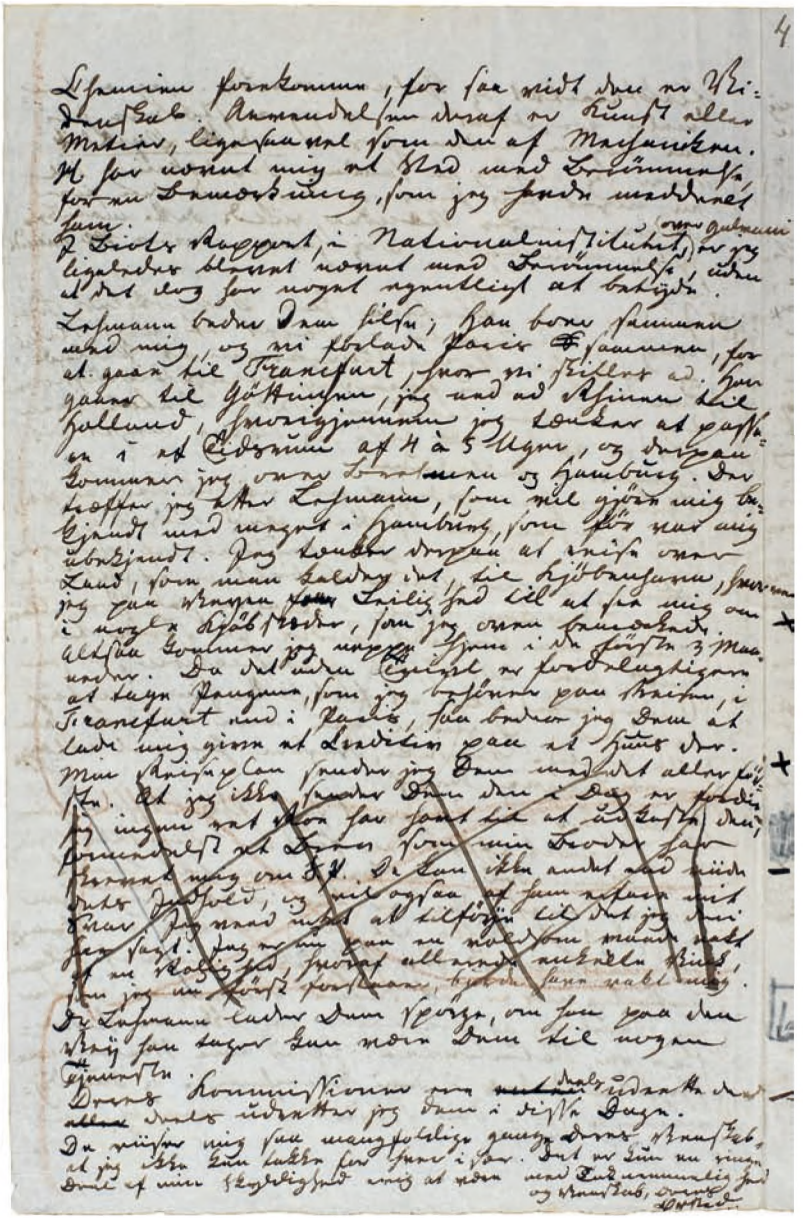

Plate 8: The crossed-out passage includes the words "… a letter that my brother has written about S.P." (See p. 208.) The letter from ASØ, received by HCØ on October 3, contained the news that Sophie Probsthein had broken their engagement.

1.

Journey to Germany, France, Belgium, and Holland (August 1801 – December 1803)

In the form of a travel journal to family and friends:

Kiel, August 1st 1801[1]

You already know from my letter to our parents that I have arrived safely in Kiel. The only pleasure that I have so far enjoyed here is a conversation with **Reinhold**. You can easily imagine that his topic was **Bardilli's** philosophy. Since you are aware that I know it only *von Hörensagen*, you easily imagine that I could not converse as sensibly as you would have done in my place. Still, the conversation was interesting for me, and it lasted more than 2 hours. You undoubtedly already know the philosophical issues from the writings of Bardilli and Reinholdt better than I can state them, so I will simply give you news and anecdotes. Reinhold will publish an exposition of Bardilli's system in his journal as soon as possible. For the next issue Jakobi will provide a dissertation, which will be 16 sheets long. It will deal with transcendental philosophy. The same talented author is again submitting something satirical to *Überflüssiges Taschenbuch*. This piece will deal with a prediction by Lichtenberg that in a few years people, who are so refined that they do not believe in ghosts, will become even more refined and not believe in God. Jakobi continues this prediction and promises that this refinement will go so far that people will believe only in themselves and ultimately believe in nothing but ghosts. How this rhymes with his respect for philosophy is as unclear to me as it was in his previous piece in *Überfl. Taschenb.* He speaks with much respect about **Fichte** and **Schelling** but complains about the rudeness and injustice

1. The year seems to have been added later.

which the latter in particular has shown him. In this connection, as we were also speaking about the great progress which the human spirit is presently making, he mentioned that a Countess Stolberg had said that humanity had now entered its adolescence (*Tölpeljahre*), where much force is united with coarseness. This afternoon I was with Reinhold and his wife in a garden outside the city, and I would have had dinner with him tomorrow if I was not leaving.

Hannover, August 12th
You see what a jump I suddenly make in my letter to you. In general, you must not expect much more from me than pieces of a diary, and that with which I have begun does not promise much benefit. However, have patience with my philosophical weakness; it may be better another time, *ultra posse nemo obligatur*[2]. At the moment I have nothing new to tell you, but I will just continue the letter in order to be able to send it and in order to ask you to do several things for me. I have Hässler's *Mathematics* in three volumes. This book belongs to Manthey and should be returned. Stadthagen owes me 2 Rd[3], but I have a novel of his entitled *Die Brautschau*[4]; I cannot find it, but it does not cost 2 Rd, so you could get a little back. – For a long time I have had a volume of Berthollet's *elements de l'art a teindre*[5] from the Royal Library. When it is convenient, this should be dealt with through Nyrup or Moldenhawer. Schleier has one volume of Polit. Journal; the others are with you. You know that they should go to Dreyer's Club. I left a number of books with Manthey, which you may not have received yet, including some borrowed ones, but there is a note indicating where they belong. Manthey lacks several issues of Bergmannisches Journal[6], which you have – will you talk with him about this? The journals of the chem-

2. No one is obligated beyond what he is able to do.

3. Rd = rigsbankdaler = rix-dollar, Danish currency.

4. *Die Brautschau oder der Kuss des Schreckens auf der Burg Nothweiler. Ein Mährlein aus den Vogesischen Gebirgen* (1796) by Christian Heinrich Spiess (1755-99), German actor, dramatist and author of popular fiction.

5. *Éléments de l'art de la teinture* (1791).

6. *Bergmännisches Journal*, German journal for mineralogy and metallurgy (Freiberg 1788-93, 1795, 1799), edited by Alexander Wilhelm Köhler (1756-1832).

ical society are also somewhere at Manthey's. Please get them, but ask Manthey first to tell you if *annales de chimie* had all the appropriate copperplates. When Brummer is to be paid, it should also be kept in mind that he has not delivered Gren's *Journal*[7] volume 2 in full, but promised the remainder, which, however, never arrived. All this must be done with the greatest possible scrupulousness. Will you check the state lottery drawing to see if there is any significant winnings for No. 35512; when in due course you ask a collector about this, *in specie* Schneider, he will probably tell you. Let me soon know how you and Sophie and Øhlenslager and Niels and Borneman are doing. Give my regards to them all. Do not forget Albertine, either.
Your
Christian

Would you please ascertain for me if my experiments on converting oil to soap and colouring syrup of violet with galvanism have been published in Rafn's *Journal*. If you do not know, Rafn can tell you. Do not forget to tell me how things turned out with the postmaster in Ringsted. Forgive me for causing you such a large expense for postage. I will spare you next time.

To Professor Manthey:

Hannover, August 14th 1801

I hope that the enclosed letter will be sufficient power of attorney for you to cash my grants. I do not want to inconvenience you further, since it is possible that the royal grant may already have fallen due. If this is not the case, I am obliged to avail myself of your generous offer of an advance. From Höber in Hamburg I received 25 *louis d'or*, together with some standard coins, approximately 5 rd. Since the things I had to buy in Hamburg, such as clothes, mathematical instruments, an English writing set, etc. amounted to 50 rd, and board and lodging are very expensive there, I had only 24 *louis*

7. *Journal der Physik* from 1790, edited by Friedrich Albert Carl Gren (1760-98), German physicist, chemist and physician. From 1799 continued by Gilbert as *Annalen der Physik*.

d'or when I left Hamburg. Of these I have now only 20 left, with which I dare not hope to reach Berlin. In order to prevent my getting into financial difficulties, I think that it would be best for me to receive a letter of credit for 25 *louis d'or* in Cassel; for it is almost certain that I can manage with what I have a good deal longer, but I know of no place along the way that does so much business that one could count on receiving letters of credit there. Certain minor circumstances have caused me to abandon, or rather change, my itinerary a little and to go to Göttingen before Cassel. I have been told that the road from Pyrmont to Cassel is very poor, the one to Göttingen on the other hand very good, besides it is one mile shorter than the other, so I save one mile of my journey that way. According to the itinerary that you were so kind to give me, including the small change that I now make in it, I can leave Cassel on August 30th at the earliest. Any letter that arrives before September 6th will reach me in Erfurt, before the 8th in Weimar, before the 12th in Jena, the 13th in Naumburg, before the 18th in Leipzig.

I find that Höber has treated me extremely well in exchanging currency, and that I had to pay a money changer 5 Lübeck shillings more for one *louis d'or* than he had me pay.
With respect and friendship,
H. C. Ørsted

Continuation of the travel journal:

Hameln, August 15th 1801[8]
My host in Hannover was quite a gallant fellow. Imagine that he invited me out for a pleasure ride together with the other guests at his table, of whom there were very few that day. We drove out in a beautiful carriage to a spot outside town, where some had coffee

8. The following note in Mathilde Ørsted's handwriting has been pasted to the bottom of the first page of this letter. The note is a slightly revised quotation from H. C. Ørsted's autobiography in H. A. Kofod, *Conversations-Lexicon*, vol. 28, pp. 515-41 (A. Soldin 1828). "In the summer of 1801 Ø set off on a journey, from which he returned at the end of 1803 after having visited large parts of Germany, France and Holland. This journey was of great importance to him as it took place at a time of remarkable scientific ferment, in which both philosophy and science made new progress."

and others wine, which we, reasonably enough, paid for ourselves. However, I think that it was not very wise to accept this offer since one may later have to pay an even larger bill.

I spent almost all of the 14th on the road from Hannover to here although it was only 5 miles[9]; but the road was very uneven and the carriages so poor that we had to be very grateful to the coachmen when they drove very slowly. This time one of the travellers saw fit to encourage the coachman to go fast with the result that another passenger, whose health was none too good, started to spit blood.

Today I visited the very famous chemist Westrumb, apothecary and chief commissioner of mines, to whom I had a letter of introduction from Professor Manthey. I received a most friendly welcome and was accompanied by him to a cotton mill, where I saw the spinning devices that you may have heard about, by means of which extremely many threads can be spun at once. I also saw a machine where the wool was carded and roved for spinning. There is also a dye-works in which everything is done by machines that are driven by the Weser, which runs through Hameln.

I spent the morning of the 16th with Westrumb at the bleach works which is connected with the cotton mill. I had dinner with him in the company of his family, which consists of his wife, several daughters two of whom are adults, his step son and the fiancé of his eldest daughter. In the afternoon he accompanied me to some of the most beautiful areas surrounding the town. Together we climbed a mountain, called Pasberg, from which one has a lovely view. Hameln is surrounded by mountains from which one enjoys the most pleasing views. Thus, on the 17th W. arranged to send the oldest of his menials to me so that we could enjoy the view from a very high mountain. Although Mr. Basse, as my companion was called, was born in the region and walked there almost every Sunday, we went the wrong way because Westrumb had ordered him to leave by a gate other than his usual. Therefore, we arrived at our destination too late and did not have the opportunity to reach the top. There was a house on the mountain where we had refreshments at West-

9. Here and below, one Danish mile (*mil*) equals 24,000 feet, or 7532.48 metres. Abolished by law of May 4, 1907 in favour of kilometres.

rumb's instruction. I found strawberries on the mountain. When we came home, W. showed me experiments with metallic calces, as he had promised. In the afternoon I visited 3 gardens outside the town with W. The mountainous surroundings make it very easy for the residents of Hameln to make delightful gardens from which one enjoys the most delightful views. One of the gardens I saw belonged to the town's legal adviser, the second to a victualler and called Villen Garten after him, the third to a wine merchant Holl, Westrumb's brother-in-law, with whom I was together that evening at W.'s.

On the 18th I was to have left on the mail coach, but W. had promised to show me some experiments, and therefore I decided to send my clothes by coach and walk the 2 miles from Hameln to Pyrmont in the afternoon. Again I had dinner with W. after I had seen his experiments, among which was his method for discovering how much gas is contained in natural mineral water; there was not really anything new in this, but the simplicity, the order, and the precision with which he performed everything were well worth seeing. W. accompanied me a fair part of the way, a little over half a mile, and had me accompanied somewhat farther by the previously mentioned Basse and an artillery officer who makes all sorts of instruments.

Now, however, I have to give you a short description of the man with whom I spent so many pleasant hours. A high degree of energy characterizes him and has characterized him all his life. Trained as an apothecary of the old school, that is in other words, rather badly, he improved himself so that now, besides his chemical skills, he commands most of the knowledge which the scholar possesses. He told me that he had learned Latin for the sole purpose of being able to cite Bergmann's writings in the Latin edition[10] and not in the German translation. He said that he owed his good fortune to a plant. He went to see Dr. Marcard, who is presently among the most distinguished physicians in Pyrmont, in order to ask him about the composition of a prescription he had sent to the apothecary. This physician had got hold of a plant which he did not know and asked W. whether he knew it, and as he immediately mentioned the name to him, he noticed him and entrusted him with the chemical investi-

10. *Opuscula Physica et Chemica*, 6 volumes (Uppsala 1780).

gation of Pyrmont water, which gave him the opportunity to study Bergmann's Latin writings and thus laid the foundation of his future happiness. W. has many social graces or, rather, is courteous, a matter which always embarrasses me as I do not know how to respond to all these fine phrases, which really have no meaning. However, little by little something rubs off so that, finally, I am reasonably good at this sort of thing even though I find most compliments ridiculous or slavish, one reason among others why I always become constrained when I am supposed to be courteous. W. is a good patriot; at the moment he is quite furious with the Prussians, who have occupied Hannover, and with the League of the North, which caused this. He is an extremely important man for the town in which he lives and for the world in general because of the knowledge and the skill with which he uses chemistry for the benefit of artisans, factories, and trades. He has made important discoveries for breweries, distilleries, bleacheries, dye-works, etc.; among others things, he has recently discovered how it is possible to clean the lye which is used for bucking so that the same lye can be used as often as people like and thereby to save considerable sums which must otherwise be spent every year on potash for a bleachery. He was even so kind as to tell me how this can be done though I had to promise him not to reveal the method to anyone until he has published it as he is presently planning to make a number of improvements at an exceptionally large bleachery in Bielefeldt, for which, as rumour has it, he is to receive 20,000 Rd when everything has been successfully completed. He did not tell me himself how much he was to have but only complained that they had not kept their word to him in several matters which had been promised, and that therefore he would not reveal all the facts of his discoveries until they had paid him. While carrying out his plans, he had met with many obstacles in Bielefeldt. Among other things, the labourers, who are Catholic, had pledged an oath that they would not work according to his method, and they had also partaken of the Sacrament on this. However, he had now got so far that a monk had released them from their oath, and that they had again partaken of the Sacrament on this. W. charges a good price for those of his discoveries which can be used to make money before he publishes them, and I agree

with him on this, no matter how much I detest this practice when used in science proper or in medicine. Therefore, W. is undoubtedly a rich man and will in time become even more so. W.'s truly weak point is his ambition, and on various occasions I felt that he could not easily forget when someone had not given him due credit for his discoveries. I clearly felt that one of the causes which secured me his friendship and which made him tell me about several things that he otherwise keeps secret was my agreement with him on some views, and the fact that some discoveries which I have made with galvanism speak for his hypotheses or, at least, partly against those of his opponents. He also informed me in writing of some experiments which he asked me to mention the next time I wrote something on this subject. Here, however, I must be careful not to incur the enmity of the chemists in Berlin, who do not like him very much. On my departure he gave me about 30 letters of introduction to other famous men.

I arrived at Pyrmont in the evening of the 18th and therefore could not pay any visits until the 19th. First I went to Dr. Marcand, physician-in-ordinary, to whom I had a letter from Professor Manthey; but he was not at all obliging so that I was really ashamed that I had gone to see him, and he is said to treat thus everyone who is recommended to him. It is true that he offered to acquaint me with Krüger, the apothecary, but I also had a letter for him and was better received there. K. accompanied me everywhere where there was something worth my seeing. In the morning I visited two natural curiosities, that is, the Vapour Cave, which is constantly filled with a gas in which no-one can live. However, it does not always contain the same amount; sometimes it is so full that it is unbearable on the top step, sometimes it is possible to walk straight down into it, indeed, on the day when I was there, I had to lie down just to be able to detect a little of it with my nose. It is not advisable to go there alone because, if one goes too far, one can easily fall into a swoon and suffocate immediately after. Recently someone had been found dead on the second step. Another curiosity in Pyrmont is the subsidences. About two years ago, a piece of the earth's surface fell with an enormous bang, like that of a cannon ball, into subterranean caves, which immediately filled with water. Since then the same

thing has happened in several places, once in the middle of the day, whereby a farmer who was out ploughing was nearly swallowed up. These caves are approximately ½ mile from Pyrmont, and the springs there have not been found to have suffered from this. – In the afternoon I visited the saltworks at Pyrmont and visited a Commissioner of Mines Weber, to whom Westrumb had given me an introduction.

I would have left on the 20th if there had been a regular coach, but this was not the case, and travelling by hired coach would cost me 4 times as much. So I stayed that day and visited Königshöhe, where Friedrich II of Prussia often stayed when he was in Pyrmont, and where he is said to have laid important plans. A memorial stone for him is placed there.

On the 21st I read and wrote but was a little unwell. In Krüger's house I made the acquaintance of a certain Hollman, who had become very poor due to unfortunate circumstances. I met him while walking, spoke a little with him, and invited him to have bread and butter in my room since I had heard from Krüger that he was a man of taste and quite interesting. But I had already formed the impression that this was not quite the case, and that he was rather one of those ferociously sensitive people that I absolutely do not like. He preached a lot of romantic nonsense about the freemasons, but I have since heard that he had not yet been properly initiated in the order.

On the 22nd I booked passage for myself and my things on the mail coach and went to Höxter. The road from Pyrmont to Höxter is abominable, and in winter it is said to be quite common that the coach overturns 2 or 3 times during the journey. In order to enjoy the route and not to worry, I preferred to walk even though the distance is 6 hours' walk or well over 3 miles. It is necessary to spend so much time on the road because it is very mountainous, and the frequent climbing of steep and rocky paths is very exhausting. I encountered nothing remarkable on the way. Krüger accompanied me to a small town about ½ mile away called Lüde [Lügde], where we went to the apothecary, got more precise information about the route, and then I continued successfully to my destination without a guide just by asking for directions. In Höxter I had an introduction to Apothecary Witting, who was very friendly and invited me

to spend the night in his house, which I accepted. However, I later sensed that he was somewhat shy about this because his wife is rather odd and now and then has a screw loose. She complained of cramps, and when I talked to her about this illness and its remedies, I won her good favour.

On the morning of the 23rd I had intended to go to Förstenberg [Fürstenberg] to see the porcelain factory there, but I learned that the person who was to show it to me was not at home and that they do not work on Sundays, so it was obvious that the best part of the visit was lost. I had to be content with amusing myself with the apothecary's rather good physical instruments.

Cassel, August 31st

When I visited the museum, the physical instruments in particular caught my attention. I could see that they were old and no longer very useful, but, on the other hand, they were important to the history of science. Therefore, through Professor Schaub, I got permission to inspect this apparatus at a time when no-one else was there. My guide was a Royal Engineer Stolz, who invited me to see his work, which I did in the afternoon with Schneider. The same afternoon I saw the canon foundry and then went to the playhouse, where they played Kotzebue's *Üble Laune*[11] quite well. The Cassel Theater has very good mechanical equipment.

September 1st. I visited Professor Matskoe, who was to have shown me the physical instruments but had sent Stolz in his stead due to a lack of time. He had the latter ask me to visit him or tell him when I was at home so that he could come to me. I thus went to him and, on this occasion, got to see the well-equipped astronomical observatory which he directs. I also saw the pottery factory but found nothing of particular interest there. I spent the rest of the day with Schaub and otherwise packing since I shall leave at 3 o'clock in the morning of the 3rd.

On September 2nd, I set out on my journey in the company of Dr. Hunold from Cassel. He told me the story of his life, how, a boy soldier, he went to America with his father when he was 13 years old,

11. *The Peevish Man* (1799), a drama in four acts.

on the ship made the acquaintance of a young surgeon, learned some surgery from him, continued this study in America, returned to Europe as company surgeon, studied for his doctorate, got it and married a sister of the famous Dr. Faust, who has written a catechism of health. Among the most extraordinary things were the generosity with which Faust had supported him in his studies before they were more closely related and the harshness with which the landgrave of Hessen-Cassel[12] had refused him his discharge so that he had been forced to stay on as company surgeon for another two years after he had got his doctorate. At 2 o'clock we arrived at Göttingen, where we had dinner and met Dr. Faust, for whose sake Hunold had undertaken the journey. In their company I visited Blumenbach. In the evening I met a Holsteiner, Schmith, who speaks Danish, and he led me to 3 compatriots, Clausewitz, Johansen, and Wilkens. I have met the last of these in Copenhagen.

The 3rd. I visited Court Councillor Meyer, who is well known as a physicist and even more so as a mathematician. I also visited Apothecary Murray, to whom I had an introduction from Westrumb. – At noon a Dr. Gumprecht, who has spent some years in Copenhagen, came to see me. I accompanied him to his home and had coffee with him. He introduced me to his brother, who is an engineer. I have received a good many favours from this Dr. Gumprecht; he has been of greater benefit to me than all the others. In the afternoon I visited Gmelin and was invited by him to the professors' club, where I was in the company of his wife. Gmelin does not play [cards], so I had the advantage of our arriving late since one can find nothing better to do in this learned club than to play.

The 4th. The first thing people ask about everywhere is galvanism. As people everywhere are curious to see the battery of glass tubes which I have invented, I have had a very small one made here, consisting of four glass tubes (in Copenhagen I used 30) and intend to take it with me. Court Councillor Meyer had given me permission to see the collection of physical instruments today, and I made use of that permission. I found it quite good, but much of it is old.

12. Wilhelm IX (1743-1821), Landgreve of Hessen-Kassel (1785-1803), later Electoral Prince Wilhelm I of Hessen-Kassel.

I also visited Gmelin today and saw his physical and chemical instruments, which he is accused of using very poorly, never making a proper experiment with them when he has no assistant. In the afternoon I also attended Blumenbach's lecture and then went to see him. Blumenbach lectures well, with great ease and clarity although a bit comical. On the other hand, Meyer, whom I heard a few days ago, lectures so poorly that I had to make an extreme effort to prevent myself from falling asleep right before his eyes. In the evening I met a man from Lybek called Winkler, who spoke Danish and asked me to visit him when I come to Lybek.

The 5th. Gmelin and Blumenbach visited me in the company of several other people in order to see my galvanic battery. Although it is not much more than 1/10 of the one I had in Copenhagen, it has a strong effect because I have introduced several little improvements. In the afternoon Gumprecht took me to the library, and from there I went to Bechman, who received me with courtesy but spoke of matters of no importance although I tried to change the subject. When we parted, he assured me that he had the most sincere interest in my well-being and lent me a thesis which I have long sought without success. In this I must admire his memory since he immediately knew that he had it. Clausewitz and Wilkens came to me in the evening. The Göttingen scholars are boring fellows, rigid complimenters and uncommunicative. Blumenbach is an exception. He is more relaxed in his nature, as in his lectures.

On the 6th I again received visits from a number of people who wanted to see my galvanic apparatus. In the afternoon and evening I was by invitation at Gmelin's, where I found a large party of both sexes. Among them was a Dr. Kohlrausch, who will travel to London this winter and there study chemistry among other things. I have now made his acquaintance. I can expect to meet him again in Paris after we part in Berlin. Professor Osiander was also there. The party was very cheerful, and there was much singing.

Among those Blumenbach brought the day before yesterday to see my apparatus was a Dr. Meyer from Erfurt. He is an odd fellow, and he wants to offer himself as my protector and adviser, but I believe that I have dissuaded him with my indifferent behaviour and numerous contradictions. He boasts a great deal of his friendship

with the famous chemist Trommsdorff in Erfurt and places more weight on it than I would on being Tromsdorff himself. However, he expects miracles from the favours he will do for me with this man.

When I came home from Gmelin, Consul Ewald and P. H. Mønster had arrived in Göttingen. The latter had informed me of his presence and that they must leave again at 4 o'clock in the morning. I went to him immediately and had a long conversation with him.

Through my galvanic apparatus I make many quite interesting acquaintances; among them, Professor Arnemann was with me today, the 7th, and made my acquaintance for this reason. I also had a visit from Kohlrausch and a Dr. Heyer, who will give me a letter of introduction to the famous Ritter, with whom he has studied. Today I visited Gmelin again and saw the rather indifferent botanical gardens which they have here. Although my battery gives me some pleasant hours, I find that I waste too much time on it as I cannot help working with it when no-one is here, whereby I have, it is true, made several interesting new observations but could easily be detained too long on my journey. For this reason I lent it to Gmelin today since he wanted it as a model for one which he wants to have made.

On the 8th, I visited a young man by the name of Hausmann, at whose house I saw several interesting minerals. This afternoon I visited Gmelin by appointment in order to make galvanic experiments.

On the 9th, Blumenbach showed me his collection of skulls from all nations. He possesses no fewer than 104 of them, which have been collected from all the corners of the world. According to the information of the learned owner, it is possible to see and feel from the shape of each skull to which human race, indeed to which nation, it belongs. He has proper proofs of where each of these heads comes from. Thus I also saw a couple of these from Denmark regarding the heads of two Greenlanders. There is hardly a scholar who receives so many presents of such things as he. At his place I saw a marsupial which had been sent to him from America. Banks, the rich scholar in England, has sent him several heads from America and the South Sea Islands and spent so much money on them that he could be said to have made up their weight in silver. Together with a Pastor Koch from Magdeburg and a lawyer, he took me to the university museum. The most interesting things there

were the clothes, the tools with which they are made without weaving, the weapons, etc. of the inhabitants of the South Sea Islands. – Among several interesting objects I must also mention a mummy which the Danish government had given to Göttingen. Blumenb. had investigated some pieces of a mummy and described this investigation together with the conclusions which could be drawn from them but had also complained that he did not have one to make experiments with. Shortly afterwards, the Göttingen scholars received a letter from the Danish government (it was in Guldberg's time) saying that they wanted to present the museum in Göttingen with a mummy for investigation. Blumenbach, who did not really want to ruin this beautiful mummy, cut it open from the back and thus examined it. Later he placed it on its back again so that it is impossible to see where it has been cut open. From Blumenbach I accompanied Koch and the lawyer to the well-known botanist Hoffmann. – In the afternoon I went to see Gmelin.

The 10th. Today I went to take leave of Gmelin. Blumenbach anticipated me and came to see me with a letter for Voigt in Jena. In order to give an idea of the difference between Blumenbach and Gmelin, I just want to tell you about the leave-taking. When I paid Gmelin my farewell visit, I offered to do him a favour when I came back to Copenhagen, for instance by getting some Norwegian minerals for him, etc.; Gmelin **bowed, thanked me most respectfully**, and **offered no favour in return**. Even before I had the opportunity to make Blumenbach an offer, **he took me by the hand** and asked me to contact him if I needed a favour in Göttingen. – This afternoon I visited the area around Göttingen with Johansen and Clausewitz. The former had given me a page from his album to write in. As my verse, at least for the author's sake, usually wins your approval, I shall write it down here.

> I wandered dales where to my observation
> fertility walked hand-in-hand with moil,
> where brothers, happy in their occupation,
> plucked fruit to bring to end a year of toil.

I shared their joy but turned my eyes to find
some trace of home and Denmark's distant shore,
as Danish brothers danced across my mind,
and longing tempered happiness the more.

I gazed from mountains, oft with clouds surrounding,
as Nature spread its treasures at my feet.
I stood in groves with laws of God resounding
and raised my total soul to Heaven's seat.

I saw what artist's hand by muses led
drew forth from nothingness to shining light.
I saw the Wise with torches march ahead
revealing Nature's secrets with beams bright.

But still my heart was restless and cast down,
for it was far from any friendly breast
where in that artless tongue that was my own,
All rage and joy could simply be expressed.

But Fate, on Leine's banks, gave me her grace.
I saw three Danes, young wanderers like me.
With open arms they rushed to my embrace,
'though friends at home we had not chanced to be.

But warmth in every heart for Denmark beat,
and knowledge had endowed each in this band.
Thanks, Friend, that through them we have come to meet.
Accept, in Danish guise, a brother's hand.

I also wrote this in Clausewitz's album, since he gave it to me so late that I could not possibly write something new. When I returned it to him in the company of my countrymen, I apologized and said that the contents showed that it was intended for all 3 of my Danish friends in Göttingen.
Your
Christian

Most of the day on the 11th was spent with preparations for the journey, for which I had already engaged a seat in the mail coach. As a journey with the mail coach is very slow, I rather preferred to travel with a return wagon if one could be found at a reasonable price. Such an opportunity seemed to present itself when a wagoner from Langensalza proclaimed that he would take passengers on his return to Langensalza, Gotha and Erfurt. I wanted to visit precisely the last of these, and we agreed on the cheap price of 3 ½ Rd. for the entire journey, which is 13 miles. However, when I suspected that he intended to cheat me, I repeated our agreement in the presence of some friends and received the answer: Ich führe ihnen **auf den graden Weg nach Erfurt**[13]. When I reminded him emphatically of what he was to promise me, he declared that he would take me to Langensalza, but that was auf dem graden Wege nach Erfurt. I then told him to go to hell and decided to take the mail rather than to be led by the nose by this scoundrel.

At 6 o'clock in the morning of the 12th I travelled by mail across Nordheim, Osterode and Nordhausen, covering a distance of 9 miles, some of which was at night on a very dangerous road, in 28 hours; in other words, no more than one mile in 3 hours. In Erfurt[14] I heard that the coach would drag me around for another 2 days before I would arrive in Erfurt although the direct route could be covered in 10 to 12 hours. I therefore hired a guide who put my baggage on a wheelbarrow and took it to Sondershausen, about 2 miles from Nordhausen. I walked along. In Sondershausen it was my intention to hire a carriole with one horse, which would take me to Erfurt. This all went quite well, and I arrived in Erfurt in the afternoon of the 14th instead of arriving there with the mail coach on the 15th. With this arrangement I at least did not lose money and gained one day and two nights' sleep, which the coach would have stolen from me.

On the 15th I visited Prof. Trommsdorff and ate dinner with him. His wife was in childbed. I also visited the chemist Apothecary Buchholz and a botanical garden, which is used mostly for promenades. In it there is a small but quite beautiful temple to Flora. The

13. I take you by the direct route to Erfurt.

14. Ørsted must mean Nordhausen.

goddess herself is in a niche with a background of natural foliage. The most famous botanists of Erfurt have been painted there, and [illegible word], Coadjutor Dahlberg has set numerous indifferent inscriptions there.

On the 16th I visited Doctor Bernhardi, a man who possesses good knowledge in natural history, and who maintains a botanical garden here almost entirely at his own expense. I then visited a Benedictine monastery, which bears the name of das Schöttenkloster, which has a professor of physics and a collection of good instruments. Among these, an exceptionally large burning glass made by the famous Tschirnhausen stands out. Buchholz accompanied me to the town's other sights, among which the large bell is particularly famous. It is certainly large, but if the whole world did not ask about it as if it were something remarkable, it would hardly be worth seeing. The only thing which could make it somewhat noteworthy is that the entire mass is well cast although it was cast several hundred years ago when they did not have the aids we have now. However, it is well worth climbing the tower where bell hangs for the sake of the exceptionally beautiful view from there. NB: For your reassurance, I can promise you that it was no more dangerous to climb that tower than the Round Tower in Copenhagen. – In the orphanage I saw the cell where Luther had spent several years as a monk. In addition, there were here a Dance of Death, in a series of paintings, and a collection of curiosities. In one of the rooms you are met by an old warrior when you come in the door. Buchholz also took me to a Carthusian monastery, where we visited a monk in his cell. Buchholz knew him well and joked a good deal with him, but finally the monk became so irritated that he showed us the door, with several invectives all directed at Buchholz, for I had remained completely quiet. From there we went to the botanical garden which Bernhardi is in charge of. It is better than the one in Göttingen but not as good as the one in Copenhagen.

In the morning of the 17th I was with Buchholz to perform galvanic experiments with him. Dr. Meyer, whose acquaintance I had made in Göttingen, arrived in Erfurt today and visited me. I spent the afternoon with him. In the evening I was with Trommsdorff, who gave me his most recent publication.

On the 18th, I travelled to Weimar and the same afternoon went to see Ritter, who lives in Oberweimar, a village about ¼ mile from there. This man has made great discoveries, of which only a few are fairly well known. Others have published some of his discoveries as their own, and therefore he is very cautious. I only succeeded in getting on more intimate terms with him after some conversation. I stayed with him until 8 o'clock, when he accompanied me almost all the way home.

On the 19th, I was with him all day, and we had dinner with the local clergyman, a very jolly man, whose humour was at times quite bold. He asked me for God's sake not to believe that the other clergymen in the area were as dissolute as he, and I assured him that I was certainly going to enter this in my travel journal to the advantage of his colleagues. – Today Ritter showed me his most striking experiments.

The 20th. In the morning I stayed at home in order to make experiments on an object on which I had disagreed with Ritter. I visited him in the afternoon and took a long walk with him. On this occasion, he unfolded to me all the new ideas which he will publish in time. I found in them so much of genius and beauty that I must consider this afternoon the most beautiful of my journey. He asked me to return in the morning.

On the 21st, with Ritter all day; again we dined with the jolly clergyman. In the evening we went to the playhouse together in order to see Madame Unzelmann, who played Mary Stuart in Schiller's well-known play with that title. She was applauded fiercely, but she did not appeal to me, and I was pleased to hear the same judgement from several connoisseurs. The play was generally badly acted, and even the stage manager of the theatre did not do his duty so that several changes of scenery were done rather clumsily.

I have entered into a very close friendship with Ritter and hope to gain much pleasure and profit from it. What I write on galvanism, he will include in his writings, which are now of such importance that every chemist and physicist must read them. He will send me all that he writes in return for which I shall send him all my works. Before I left, I had to promise him to come to Weimar once more, which can easily be done as Jena is only 2 miles from

there. On my departure, I gave him as a remembrance a book which I had with me, and which he had wanted to own. He promised to send me one of his books, which he expected shortly from the bookseller.

Early in the morning of the 22nd, it really should have been the night before at 10 o'clock, I went to Jena on the mail coach. I could not immediately get a decent room but had to be content with sharing with a Russian with whom I had travelled. However, this lasted only until the evening as I had declared that I wanted a room to myself. I visited Voigt, the engineer, and Dr. Friedrich Schlegel. The latter talked about his cousin, Professor Schlegel in Copenhagen. He knew that he had written against Fichte and told me that he had intended to have it translated in order to oppose it. I told him that my brother had already refuted him sufficiently.

On the 23rd I performed a number of galvanic experiments and visited Göttling. I actually wanted to visit Voigt, who is professor of physics, but I had to change my destination when I did not find him at home. On this occasion my enormous absentmindedness, which I think I have partially outgrown on my journey, played a trick on me. I had an introduction from Westrumb to Göttling, and I also had a letter from Blumenbach in Göttingen to Court Councillor Voigt, but I was so absorbed in the conversation that I intended to have with Voigt that I gave Göttling Blumenbach's regards and delivered the letter. Without looking at it, he opened the letter and did not notice the error until it suddenly occurred to me. Göttling assured me that there was nothing in the letter other than an introduction and returned it to me. I now discovered that Blumenbach had recommended me to his brother-in-law Voigt as an excellent traveller, and I was very pleased that a man whom I respect so much has such a high opinion of me.

On the 24th I visited Voigt and found him a very courteous man. He requested from me a description of my galvanic apparatus to be printed in his *Magazin für Physik*, which I have since provided. I ate with him in the evening.

On the 25th I performed galvanic experiments and wrote letters.

On the 26th I visited Schlegel again and also Professor Lenz, whose field is mineralogy.

On the 27th I made the acquaintance of a physician from Mechlenburg, whose name is Ritzers. He understands Danish quite well and has applied himself to the language solely for the sake of the beautiful literature. I also visited Professor Fischer, who has written several works in physics. This man is undoubtedly in a miserable condition. He has married his servant, who keeps no order at all in the house so that I have never seen such filth as I saw in his house. At the invitation of Professor Lenz I also went to the mineralogical society, where I was admitted as a member. No expense or obligation is involved in this, on the contrary it gives several advantages as long as one is in Jena since one can visit the mineral collection and the library free of charge.

On the 28th, 29th and 30th I repeated visits with many philosophical discussions which would be of no interest to you. As I am obliged to remain in Jena until I receive an answer to the last letter I sent to Professor Manthey, I will use much of the time to read philosophy and other things which are often discussed at parties.

I spent October 1st and 2nd for the most part with Lenz and a Doctor Schad, who has some philosophical knowledge. On the 2nd I dined with Schlegel.

On the 3rd I made the acquaintance of a Doctor Ersch, who is the librarian here. He had one of Voigt's sons tell me that he wanted to make my acquaintance, and that I should visit him at the library.

[Some letters are missing, covering the period from early October to early November. In his travels Ørsted has now reached Leipzig.]

... whether or not I shall regret that I contradicted him so often. It would probably be good if one could follow Abrahamsen's rule:

> When a wise man preaches often to thee – then bow
> On things that you learned at your mother's knee – then bow.
> Wise fellows like the sound of your speaking
> As swallows enjoy the winter wind's shrieking – so be quiet,
> bow again etc.

In the evening I visited Professor Essenbach, who is the well-established chemist of Leipzig University, and that is all that I can say to

praise him as a chemist. As it happens, he is a very courteous man, who entertained me for more than one hour with many small things. I had to force him into scientific discussion, but I can honestly assure you that I was not one grain richer in knowledge when I left him than when I arrived. This morning, the 3rd, I visited the famous Professor Hindenburg, who can rightly be regarded as one of the greatest mathematicians of our time. He has personally created an entirely new branch of mathematics which I studied to some extent in Copenhagen, and which I will study even more when I have the chance. I asked him how best I might proceed with this and also asked him if he did not believe that it would be of value in chemistry. He assured me that it would and added that the use of his calculations would make it possible to obtain the results which mathematical chemistry has already obtained in a much simpler manner. He is perhaps the only scholar here whose acquaintance has been of value to me. – I also visited Rost's art shop today and found several exceptionally beautiful copperplates, and other wonderful things, although it was not quite up to my expectations. – I also visited a reading library, to which I was taken by my hired guide. Almost all the important journals which are published in Germany, France and England can be found here in 2 rooms, where you can sit down and read them. My guide assured me that he had the right to take visitors there without them having to pay anything. – Leipzig has many beautiful promenades. One of the most pleasant I know goes around the city, where the ramparts used to be. One wanders there among firs and other beautiful trees in irregular rows, along a canal which used to be the city moat. However, the entire promenade is not of such exceptional beauty since part of it consists merely of straight avenues. – A garden, which bears the name of Löhr[15] after its owner, has been praised as exceptionally beautiful, but I found it to be a quite ordinary English park where only one sculpture, which is there in the company of many poor ones, pleased me. It is a group which represents a young beauty being crowned with a wreath by a god of love. A man stands behind her, with his back turned in a pose of

15. Löhr's Garden, established 1770-71 by Eberhard Heinrich Löhr (1725-98), banker and councillor in Leipzig.

despair, with a drawn knife in his outstretched arm. The best part of it is the arrangement of figures, which is very pleasing to the eye.

The 4th. I visited the institute for the deaf and dumb here, which has the advantage over many others that the unfortunate people, who cannot talk because they do not hear, can with the help of signs be shown how to use their tongues more or less as we do. The teachers had a number of them add, write and speak in my presence. Arithmetic and writing clearly went better than reading aloud as the sound of their voices was very unpleasant. However, a girl of about 15 or 16 had also progressed considerably in this so that she could pronounce even rather foreign words, like **Copenhagen**. She also wrote quite well and understood some geography so that she was immediately able to locate Denmark and Copenhagen on a map without names. Her writing book, which she showed me, was, hardly by accident, opened at a place where she related the events of the previous day, among other things that a man who had been there had given her a coin that was worth about 24 Danish *skilling*[16]. As she was the one whom the teacher entertained me with, and as her clothing belonged to the poorest among the students, I took the opportunity to give her a similar amount. It was remarkable that she could understand everything that the teacher said no matter how softly he spoke, but she did not understand me. The teacher said that she could read his lips. – In the evening I went to the playhouse and saw *der Tyringer Vastel*[17] by Schikaneder. The piece is a comic opera filled with violations of the rules of taste and art. However, it contains a number of well-constructed scenes which almost force people to laugh. I was moreover in particularly good humour and enjoyed myself far more than with many pieces which have been much better. The entire Leipzig audience appeared to share my humour, at least they applauded so violently and at such length that I really thought they intended to mock one poor actor who played his role very badly.

On the 5th I travelled from Leipzig to Halle. When I and one of the other passengers decided not to give the coachman an unneces-

16. An obsolete coin worth about a farthing.

17. *Der Tiroler Wastl* (1796).

sary tip (NB I hardly ever do) on the grounds that he had driven us extremely slowly and poorly, he told us that he could have overturned us on the road if he had wanted to, and I admit that I do not believe that we would have had any compensation if he had done as he pleased. In the coach there was a surgeon who had studied in Vienna under the famous eye doctor Dr. Behr. He asked me if I knew a Professor Manthey, whom he had not met himself but often heard mentioned by Behr. He told me that Dr. Behr will come to Copenhagen in a few years. I have heard the same from Professor Manthey.

On the 6th I visited Professor Gilbert, Sprengel, Niemeyer and have been invited by each for different times. They have been exceptionally courteous. I shall tell you about them when I get to know them better. The doctor with whom I travelled yesterday is a Dr. Spangenberg. He had heard Gall's lectures in Vienna but had the modesty to admit that he did not really understand how to feel people's heads. However, he thought that he could find many fine qualities on mine, including tenacity or perseverance (*Beharlichkeit*), a virtue which I unfortunately have no reason to believe I possess.

[A strip has been torn off the top of this page.] A countryman of mine, a son of Financial Councillor Kaas, lives in Niemeyer's house, and I have made his acquaintance. He seems to be a cultured and well-educated young man. He occupies himself with the study of old languages, primarily Greek.

On the 7th I was at Gilbert's for dinner. We spoke about many physical subjects, and I told him many of my ideas which seemed to win his approval. After dinner he walked with me and showed me one of the most beautiful parts of the area, which does not mean much. In the evening I visited Niemeyer, where I found many guests including a Prof. Vater, a physician Oerting, a student Niemeyer, and Dr. Spangenberg, with whom I had the opportunity to talk. Niemeyer's wife is a woman of considerable intellect, and I was sorry that the size of the party did not permit me to talk as much with her as I wished. At table there was much talk about a certain Schelver, currently giving lectures in Jena, who wins much approval for his vague and, as I was assured, poetic lectures. I said that I found it very surprising that he had now acquired such a poetic

style because a couple of years ago he had written a book whose style was quite vulgar.

On the 8th I had dinner again at Gilbert's in the company of Professor Spengel. That scholar has much knowledge and an extraordinary memory. It is hard to find a subject that he does not know. He also understands many languages, among them both Danish and Swedish. I had expected him to be an old man who lives only for the sake of reading, but on the contrary he was a cheerful and sociable man in the prime of life. In the evening he took me to the Masonic lodge, where it was my belief that no uninitiated person dared to come, but here I found it associated with a club where a party of some 50 people, men and women, played cards and later ate. However, the real Freemasons in the group have a private gathering from time to time. In the party was a paper merchant, Keferstein, who has relatives in Copenhagen. Today I also visited Professors Reil and Klügel. Reil has made important applications of chemistry in medicine, but the philosophers have criticized him for it and seem to have scared him so much that he was really reluctant to talk about it and complained about the philosophers' abuse. If I had nothing more important to do, it would be easy to prove that these philosophers had simply not understood what they were talking about. Professor Klügel seemed to take great pleasure from the compliment which I paid him on my arrival and did not know how he could show me sufficient courtesy.

On the 9th he came to me in order to take me to the observatory and spent almost all morning walking with me. In the afternoon I saw the saltworks and there met Keferstein, the paper merchant, who showed me around and made it possible for me to see everything better than I otherwise would. He took me to a redoubt where I played billiards. He invited me to his house for the evening but [A strip has been torn off. Most of the top line of this page is missing] ... of scholars who meet every Monday at the Lion, where I am lodging, I was unable to accept the invitation. I was not greatly amused in that party, and there was hardly any interesting conversation.

On the 10th I paid farewell visits, among others I visited Keferstein and spent a fairly long time conversing with his wife, who has

been in Copenhagen and who always thinks of it with pleasure. She has quite a few relatives in Copenhagen, including Legal Councillor Heger. In the evening I visited Klügel, where Professors Jakob and Hofbauer, his sons-in-law, were present. I had a long discussion on Kant's *Naturphilosophie* with Jakob, who was a famous philosopher in Germany 3 or 4 years ago (philosophical greatness does not last long in this country). I put forward my ideas and noted that they met with his considerable approval. Klügel's wife gave me an introduction to their son Mining Adviser Klügel in Berlin.

At 5 o'clock in the morning of the 11th I began my journey to Berlin, where I have now safely arrived. On the mail coach I had the opportunity to become acquainted with some remarkable characters who, during the journey, both amused and irritated me, according to circumstances. I had the honour of travelling with 4 officers, each quite different from the others. One by the name of Plaketsky had served in a couple of campaigns and was already a sober and sensible, though uncultured, man. One Ensign Sydow, a mother's boy who could not bear being shaken a little by the coach and became unwell, said that it was also too strenuous to travel on horseback and more to the same effect. He amused himself heartily by firing a pair of pistols he carried with him and did not stop until the coachman would not put up with it any longer. Along the way we were first joined by his antipode, a Lieutenant Herzberg. I had not expected to find an officer like that outside comedies. I have never seen such indignation when one of his comrades told him about a man who had beaten an officer, and no punishment struck him as harsh enough for such a rogue. He insulted every woman he met, and he also insulted coachmen, passing travellers and peasants with great pleasure. There was hardly a stop where he did not have some quarrel or other. The main object of his stay in Berlin was to visit houses of ill repute, and he bitterly complained that we would arrive in Berlin so late at night that he would be unable to visit such a place immediately. The fourth was a Lieut. Hennings, who gave grounds to hope that he might develop some sense with time. – Among several remarkable anecdotes, there was one about the King of Prussia, who wanted to punish some students in Halle, who a couple of years or more ago had derided a prince, by sending them

into the army. These gentlemen seemed to ... [The letter ends here. Some letters are missing, covering the period until November 29th.]

... to lead [him?] on the right track. The first thing he asked me was whether I had read anything about galvanism in Gilbert's *Annals*. I could answer no better than by starting to tell him about several topics which are treated there, and about the consequences which they must have for science. I did not find him to be particularly well-informed, and he tried to defend what he had once said with much sophistry. As I was seated next to him at table, I had sufficient opportunity to talk to him about many subjects. This *Geselschaft der Freunde der Humanitet* consists mostly of scholars who meet every Saturday evening to divert themselves with readings of various papers which members of the Society have prepared for the occasion and with discussions, especially about the topic of the paper. There is much sense and order in the whole constitution of the Society. The paper this evening dealt with the philosophical division of the *belles-lettres*, which contained nothing more than things said some years ago by Ben David. The member who read the paper said that he had taken its main ideas from a treatise which Professor Hermann in Leipzig had published, but Ben David observed that the ideas were really his; however, he added with much courtesy that Hermann had probably not been aware of his treatise as it had been published in Vienna, from whence books rarely come here, and had probably come upon these ideas himself.

On the 29th, I spent the morning studying. In the afternoon I had a visit from Dr. Weiss, who is also here for the sake of chemistry. I spent the evening at Herz's in a very large gathering. There I met many of my acquaintances, Darbes, Kohlrausch, Salm, Bahr, and others. Besides, I made the acquaintance of Pastor Jenisch, who possesses a great deal of linguistic knowledge, a Dr. Detmoldt, who conversed with me for a long time about the latest in physics and philosophy, a young man from Hamburg, Julius, who has fairly good amateur knowledge of physics, etc. This gathering, which is called *Kränzchen*[18], meets in the houses of various families by turns

18. The little circle.

and amuses itself with conversation, song, music, and the like. Madame Herz sings in several languages and is undoubtedly very skilful in music, for she continuously helped Detmoldt, who accompanied her on the piano but was not very successful.

On the 30th, I was with Darbes, Rose and Bendavid, with the last of whom I had a long conversation about German literature. He told me many interesting anecdotes, among others one about Plattner, who, as is well-known, has a great talent for public speaking, but even more vanity. An equally vain and talented scholar, Herr von Sonnenfels, once heard a lecture by him with which he was so satisfied that, on leaving, he said to someone: Plattner reads almost as well as I. Plattner was later told this and answered, "The fool, he thinks that he reads almost as well as I." The way in which Kant's writings were first reviewed in *Allgemeine Litteratur-Zeitung*, is also remarkable. The review had been assigned to a critic who had made a great effort to understand Kant's book, but in vain. When he happened to receive a visit from Garve, he asked him what to do with it and begged him to take it with him to see what he could get out of it. Garve read some parts of it and answered that it was an important work, that he did not yet fully understand it, but that he was reading it pen in hand in order to mark the passages which he had to consider more carefully, and that it would be a long time before he would be able to write a review of it. However, Schulz in Königsberg hurried the publishers of *Litteratur-Zeitung*, saying that it was a shame that, for eighteen months, they had not brought a review of such an important work. They again hurried Garve, who answered them that he could not deliver anything so soon but still sent them 18 sheets, which he had written about it for his own enlightenment; if these could lighten their task, he would be very glad. They were quite pleased with this. Without reading Kant more closely, they chose the most remarkable of Garve's comments, put them together to form a whole, and made a review of this, which of course was so bad that later they almost had to apologize for it. In the afternoon I was in the library, where as usual I found a couple of attendants but no librarian, so I went in myself and took what I pleased, and if I had wanted to, I could easily have put the whole library out of order, that is, if it had any, for I am not completely

sure about that yet. I spent the evening with Pastor Hermes. I visited them particularly to calm him and his wife. They had told me that they had received a letter from a brother of Gensichen in Worschau, in which he writes that Carl Manthey was to travel to Tranquebar, and now they feared that he had been out in the storm which had caused so much damage. This very day Darbes had told me that he had received a letter from C. M. a few days before my arrival in Berlin, which he had not yet answered. From this I saw that C. M. must be safe, which I hastened to tell them as I quite rightly assumed that they were not likely to have received a letter from Copenhagen since that time. From what I heard from Darbes, I should rather think that the report that C. M. was going to Tranquebar is based on a misunderstanding.

On the 1st of December I visited Richter, whose friendship for me continues as it began. In the afternoon I visited Privy Councillor Rosenstiel, but I only had a brief conversation with him as several others had come to talk to him.

On December 2nd, I visited Dr. Weiss, whom I appreciate more and more. He has a good mind and much knowledge. Then I went to Klaproth to see a large galvanic battery which he had built some days ago, but to my regret it had already been taken apart again. Klaproth promised to let me know when it would be rebuilt. However, I have lost nothing thereby, except the gratification of my curiosity, since Hermbstädt will build one of the same size with which I shall even have the opportunity to experiment myself. – In the afternoon I went to Professor Rudolphi, who is at the veterinary school, and met Dr. Meier there. Our conversation dealt primarily with medical issues, which you would not find edifying. I also saw a turtle dissected there.

December 3rd. Today I have started to work in Hermbstädt's laboratory. He has entrusted me with the investigation of 5 different kinds of alum, which the management of the factory had sent to him in order to hear his opinion of them. Incidentally, I wish for Hermbstädt the same as Meissner's Alcibiades[19] wished for Phidias, that he would become the most idle man in town so that for once he could devote some time to me; for all the trust and all the friendship he

19. Novel by August Gottlieb Meissner (1753-1807).

shows me may merely be on Professor Manthey's word as he has not yet had an hour's scientific conversation with me.

On the 4th, I was also at Hermbstädt's laboratory, where I expect to spend most of my time from now on. In my absence, Dr. Fliess had called on me in order to talk with me. I therefore went to see him and heard from him that he had a patient whom he wanted to treat with animal magnetism. Darbes, he, and I were to be present at the treatment all the time. Darbes, because he knows the technique best, I in order to indicate the physical experiments which could be performed in order to get closer to the nature of this thing, and Fliess has to perform the operation, with which I, for several good reasons, want nothing to do, for which you would thank me if you knew the reasons. Besides, we do the whole thing very secretly because the matter has acquired a bad reputation through false rumours and could therefore harm us with ill-informed people.

Professor Darbes asks you to tell Carl Manthey that he has received his letter, and that he has delayed his answer, as well as that to his brother and sister, until he has received the necessary information.

It is now almost 3 weeks since I first wrote from Berlin. I am longing so much for an answer, which is presumably on its way. You can easily imagine my extreme eagerness to hear how you are, and I also long for a letter from Prof. Manthey.

Your
Christian

To Professor Manthey:

Berlin, December 4th 1801

In my previous letter I forgot to tell you that I had availed myself of the commission which you had given to Hermbstädt to advance me some money. It is true that the money which you had been so kind as to have paid to me through Barthels enabled me to stay another month in Berlin, but my everyday clothes, which were already old and turned when I began my journey, were now so shabby that I was obliged to get new ones, which I have had made on your advice for the journey so that the suit is of dark grey cloth and consists of a coat and trousers with a black silk waistcoat. A new overcoat, a cou-

ple of books that were absolutely necessary, and a course of lectures with Karstens, which costs 2 *Louis d'Or*, have absorbed most of my remaining capital. So far I have only taken 8 *Louis d'Or* from H., but I shall shortly be obliged to raise my debt. On a rough estimate, I see that I shall probably be able to pay this and spend the winter in Berlin on my grant, but I cannot imagine what will happen when I begin to travel again if I do not receive a royal allowance. At least the travelling will absorb most of it so that I shall be obliged to make the most harmful reductions in all the expenses that I wanted to reserve for my education.

In the evenings I read no book more frequently and with greater pleasure than Winterl's *Prolusiones ad chemiam seculi decimi noni*[20]. On each new perusal I find more harmony and genius in it. I just long to repeat some of his main experiments, but the terrible prejudice (I dare call it thus as I do not yet know anyone who has criticized Winterl in such a way as to show that he had read him) which prevails here and everywhere makes me somewhat wary of even talking about it. However, I hope to find an opportunity. I persuaded Ritter to read it and had the pleasure of finding that his judgement coincides with mine. Anyhow, I assure you, by all the confidence that I ever want to enjoy from you scientifically, that more and more I find the stamp of truth everywhere in this somewhat strange book, and that, even in technical chemistry, it occasionally gives information which is not unimportant. Maybe you have already read this book and know it better than I, but in that case I am even more pleased as I shall see my judgement confirmed by you all the sooner.
In respect and friendship
H.C. Ørsted

Continuation of the travel journal:

On the 27th, I visited Aronson, a Jewish doctor, who enjoys general respect because of his scientific training. Among other things, he has written on cowpox against Marcus Herz. I went to see him, especially because I knew that Dr. Mendel, who spent some time in Co-

20. *Introduction to the chemistry of the nineteenth century* (1800).

penhagen, had given him a translation of my works on *Naturphilosophie* in order to have it prepared for printing. It has not yet been printed because the booksellers do not really want to have anything to do with such short works, particularly when they are scientific. In the afternoon I went to see Grapengiesser, who cures sick people *en gros* with galvanism, on completely false principles as it seems to me.

I spent the 28th in Hermbstädt's laboratory. In the evening I went to the playhouse and saw the play *The Deafmute*[21].

On the 29th, I visited Pastor Hermes in the evening. I had spent the day in Hermbstädt's lab.

On the 30th, also in Hermbstädt's laboratory.

On the 31st, I visited Friedrich Schlegel in order to acquaint my friend Weiss with him. Among others, F. Schlegel's brother, August Wilhelm, was also there and developed several interesting aesthetic ideas. In the afternoon I went to see Grapengiesser in order to make galvanic experiments with him. I spent the evening at Hermbstädt's, where I met Medical Councillor Knope, Professor Wrede, and others. Wrede is a very knowledgeable man. I spoke with him about Winterl's chemical system, which he had studied a little but confessed that he did not fully understand. However, he expressed himself more correctly and more favourably about it than the other chemists in Berlin, who have not read it.

January 1802

On the 1st of January, I made experiments with a galvanic battery with very large plates, which I had borrowed from Klaproth. They did not have the expected effect because they were badly made. I have since heard that Klaproth has not been able to get anything out of them either. This time New Year's Day was a two-fold celebration for the Berliners as the new theatre was opened on that day. But this event also made it a day of mourning for many, for the crush at the entrance was so great that many people were brought out in a faint. Ladies' shoes, which had been so trampled upon that they could no longer be used, were found in great quantities, and in

21. *The Deaf and Dumb, or The Abbé de l'Epée* (1800), a historical play in five acts by Jean Nicolas Bouilly (1763-1842).

the short time when I was a spectator at this drama outside the theatre, several ladies, without their shoes, with torn clothes and perspiring freely, emerged from the crowd through which they had intended to push their way to the entrance. One lady emerged almost naked, another had her false hairpiece turned around, and thus one saw nothing but confusion everywhere. I had gone there with the intention of buying a ticket, but when I saw how much inconvenience one risked, and that, at any rate, one had to expect to have one's fine clothes ruined, I deferred the pleasure of getting to know the new theatre to another time.

The 2nd. In Hermbstädt's laboratory.

On the 3rd, I was invited to dinner at Herz'. There I found Darbes, Fessler, a Vice-Chancellor Grasshof, Court Councillor Fischer, and others. Madame Herz really applies herself to physics and chemistry and likes to converse with me about galvanism. I have had to promise her to make some experiments in her house one of these days. She told me that she did not go to Hermbstädt's lectures because she did not expect them to be profound enough. Hermbstädt's course of lectures is for ladies. Today I also heard Schlegel's lecture on aesthetics, which he gives to an audience of both sexes.

On the 4th, I took a letter from Professor Manthey to Assessor Roesch, who is a member of the board of the local porcelain factory. He showed me several of the devices in the factory and promised to show me the rest some other day as everything could not be viewed in such a short time. The things I saw, however, were among the most important, especially the oven, which, in my estimation, was extremely well designed.

On the 5th, I went to see Richter and spoke with him about a great many scientific matters. Among the Berlin scholars, he is the one who most readily imparts his knowledge and also shows a fairly sincere interest in me. The rest of the day in Hermbstädt's laboratory.

To Professor Manthey:

Berlin, January 5th 1802

As it undoubtedly is of interest to you to learn as soon as possible the information which I can impart to you regarding the questions

you have put to me concerning the breweries, I have not postponed my answer longer than was necessary for me to obtain the necessary information. I am only sorry that all the information has turned out to be so negative that it can be of little use to you.

The breweries here are *zünftige*[22] and are usually owned by the richest families. You ask if they have a kind of agreement here. If I understand the question correctly, I must answer no. I have asked Hermbstädt if every brewery brewed the same amount, and if they delivered what they could not sell to a general guild depot, which he denied saying that each of them brewed as much as they found appropriate. H. promised to write down what he knows about the breweries here which is not generally known, but at that moment nothing occurred to him. He may have mentioned this in the accompanying letter.

Both Richter and Hermbstädt are of the opinion that there is no general test for beer. Richter said that as there are two unknown quantities to consider which depend on one another, that is, the quantity of alcohol and the amount of extractive matter. Thus it becomes an algebraic function, and it cannot be determined by any simple means such as the aerometer. Since the extractive matter increases the specific weight of beer and alcohol decreases it, it is easy to find a proportion for which these two opposite tendencies cancel each other, and in this case the aerometer would give precisely the same indication as in water.

On this occasion I offered to R. my opinion that one could determine the quantity of extractive matter by evaporating the beer a little. I do not think it is necessary in this regard to evaporate it to dryness, but rather that it would be sufficient if one evaporated, e.g. ¼ and then determined the specific weight with the aerometer. If one had determined once and for all a given beer's content by distillation etc., and if one then compared the specific weight which one beer sample gave with the specific weight of the sample that had been evaporated, one would surely obtained satisfactory results for any given kind of beer. Richter did not find this opinion untenable but merely remarked that it would be extremely difficult

22. zünftige = belonging to a guild.

to perform the necessary preliminary investigations, and that each individual investigation would require one or more hours. He promised to inform me if he discovered anything useful regarding this matter.

Roesch has already shown me much courtesy due to your recommendation, and both he and Richter send you their regards with much friendship. That I am on such friendly terms with Richter, that I have often spoken with Hermes and several times been with his family, that I frequently visit Klaproth and Rose, that I have seen Renard and Neperschmidt, I hope that you have seen all that in my letters to Sophie. Many regards from the chemists and physicists in Berlin.
With respect and friendship
Ørsted.

Continuation of the travel journal:

The 6th. In the morning in Hermbst. lab. In the afternoon I heard 3 medical students taking their examination in anatomy in order to obtain the right to practise. They have a long time to prepare this examination, which consists in a lecture on a specific part of the human body. It is even very easy to have someone else do it for them. Today I also heard Kiesewetter's lecture on psychology. His delivery is not too bad, but what he says is completely trivial and insipid. A good part of his audience consists of officers and Jewish girls.

The 7th. In Hermbst. lab. – This evening Assessor Roesch introduced me into the Therburg *Resource*, a kind of club which gives me the advantage that I can go there in the evening if I want some diversion.

The 8th. In Hermbst. lab. At noon I ate in the company of Rudolphi *im Englishen Hause* and there met an old man who addressed us when he heard that we spoke about galvanism. He was extremely pleased with what I told him about it and said that he had spoken a great deal with Grapengiesser and Deluc about it without getting this information. After lunch I visited Fichte with Rudolphi, but as he does not understand philosophy, the conversation was about such indifferent matters that it was of no use to me.

On January 9th, I visited A.W. Schlegel. The more intimately I get to know him, the more I am confirmed in the thought that he is merely the echo of the great or talented men who surround him. Göthe, Fichte, Schelling and his supporters, as well as his brother Friedrich, who is certainly greatly superior to him, seem to determine his philosophy and aesthetics. In the evening I saw the comedy *Die Aussteuer*[23] by Iffland. This was the first time I saw the interior of the new theatre, which opened on New Year's Day. I find the building rather tasteful, and the decorations also deserve high praise, but the curtain has been painted in a really unworkmanlike way, and the changes of scenery are not performed with the proper alacrity. Besides, the house has two other serious defects, that is, that there is such an abominable draught that it is not easy to hold out in the pit, and that the sound has been so poorly taken care of that in most places very little can be heard of what is said on stage, and in some places the sound is even double.

On the 10th, I went to see Rose, with whom I had a long conversation about Winterl's chemistry, with which he confesses he is not really on speaking terms (as they say in an old proverb). He and several others have asked me to write a short exposition of this extraordinary man's ideas for the Philomathic Society[24], which I shall be able to do with very little trouble. In the evening I was invited to Herz's birthday party, at which the famous musician Reichard was present and gave us a little concert with the assistance of some of the ladies present. At the party I made the acquaintance of a young man by the name of Schulz, who knew my compatriots Møller, Steffens, and Kaas. He invited me to join them when next they were going to meet in his house.

The 11th. Hermbstädts laboratory.

The 12th. Likewise. Today Hermbstädt conducted a Swedish Councillor of State and Knight v. Edelkranz around his laboratory, on which occasion I made his acquaintance. In the evening I met him again in the Society of Naturalists at Rose's house. We had a very interesting evening as two important new discoveries were an-

23. *The Trousseau* (1796).

24. *Philomatische Gesellschaft* in Berlin was founded in 1800.

nounced there, namely the new planet, which is to bear the name of Ceres, which has now been completely discovered by Dr. Olbers in Bremen, and a new metal, which is to be called Tantalum. This has been discovered by Geyer in Stockholm, but what properties it possesses has not yet been announced.

The 13th. Hermbstädts laboratory.

On the 14th, I visited Friedrich Schlegel, with whom I am becoming increasingly intimate. If only he could stay here all winter, I hope that I would profit greatly from his acquaintance. In the evening I was in the Philomathic Society, which held its big quarterly meeting. On this occasion, almost every member brings a couple of visitors. I was there with Hermbstädt. In the society I found Professor Matieu, whom I had got to know in Jena. At the quarterly meetings the gathering ends with a meal, which is usually not the case. Bode read a treatise on the moon, which contained nothing but well-known things. Bendavid, who is the secretary of the society, entered into the minutes that Bode had read a very instructive treatise. In the minutes, he thus praises all that is read in the society in a most ridiculous way.

Your
Christian

[Added in the margin:] Tell Anders from me that the things he sent me cost only 28 *skilling* in postage, but that I found no Siofna[25] among them.

On the 15th, I had the pleasure of seeing a compatriot here, and even one whom I already knew from Copenhagen, that is, Gjerlev, who travels at public expense on behalf of pedagogy but in particular studies philology. At present he is staying at Halle in order to hear the famous Wolff's lectures on Homer. In the company of Niemeyer and a certain Pastor Wagenitz, who has written a *Moral in Beispielen*, he had now come to Berlin for a few days. He had immediately announced himself to Count Baudessin, and therefore he and I were already invited to dinner with him today. There were no other guests, but nevertheless everything was quite splendid. There

25. A literary anthology, edited by A. Oehlenschläger, 1802.

was a servant behind almost every chair, 3 or 4 different kinds of wine, etc. today just as it was last time. In the evening Gjerlev and I went to the playhouse, where Voltaire's *Merope* and a farce called *Two Uncles for One* were performed[26]. Mme Meyer acted particularly well in the first of these.

On the 16th, I took Gjerlev to see our compatriot Darbes. In the afternoon I made galvanic experiments for Madame Herz, who had asked me to do so. She takes great interest in physical investigations and likes to converse with me about them. If I wanted to, I could make you quite [jealous], but since you are so far away that you are unable to apprise yourself of my conduct, I must at least tell you all the circumstances[27]. I had asked Dr. Kohlrausch, who often visits Herz's house, to assist me in some galvanic experiments, for which some frogs were to be dissected. He had talked about these experiments in the Herz house, and then I immediately received the request to make these experiments there. However, it was impossible for me to get any frogs as the frost had closed all access to them, but since I did not want to postpone it for too long, fearing that it might be considered a lack of good will, I made several other small experiments instead and explained part of the theory. Madame Herz had told several people about these experiments, and therefore Pastor Schleiermacher, two brothers Meyer, one of whom is staying in the house, Dr. Detmoldt, and others put in an appearance. Her effeminate and conceited husband was present, too. It is extremely unpleasant to experiment in such company, where everyone wants to have a finger or at least a voice in the proceedings, and I am certain that no experiment would have succeeded if I had chosen completely new ones which I had not performed before myself. When I left Herz, I went to an evening party, to which my friend Weiss had invited me. There I met one Møller, who has written something against Fichte's *Geschlossener Handelsstaat* in Genz's *Journal*[28], one von

26. *Merope* (1774), a tragedy in five acts after Voltaire and *Zwei Onkel für einen* (1781), a farce in one act, both by Friedrich Wilhelm Gotter (1746-97).

27. This sentence has been deleted. Especially the words "jealous" and "conduct" have been vigorously crossed out.

28. *Neue deutsche Monatsschrift* (ca. 1795-1801), edited by Friedrich von Gentz (1764-1832).

Rettel, and others. We began by drinking tea and talking about philosophy. Rettel, who thought that he understood Fichte's philosophy, immediately found an opponent in me. Out of a certain contrariness, out of a hatred of all impudent mulishness in delicate matters, especially in people whom I do not credit with much knowledge, and finally out of a desire to sound people out, I willingly debate philosophical matters. At the beginning I speak as a sceptic, but as soon as my opponent has taken one side, I immediately take the opposite. I soon got this opponent into difficulties and almost forced him to surrender unconditionally. After we had sat down to eat, we talked about Gall's system, and now interest became much more general and much more lively. Even though I maintained that I did not know how to feel people's heads *à la Gall*, I was almost obliged to say something about everyone present. In this I stayed with what I remembered and said some things which were rather pertinent. At the end a lot of poor student songs were sung to poor wine. Nothing is more abominable to me at a drinking party than poor songs and a lack of entertainment of a higher order. If a drinking party is not to be an abomination to me, it must be a true celebration where, among people of culture, through a moderate measure of strong drink, I reach a more elevated state, whereby my soul is more open to pleasures but also to higher feelings of every kind. Merry songs at the beginning and later serious ones, like Schiller's *Ode to Joy*, that is what I want. It was really a couple of simple-minded fellows who ruined the spirit of the party. This was felt not only by me but by several others. As we parted, Møller shook my hand and asked me to call on him, for here, he said, he had not been able to talk to me as he wished. We did not part until 2 o'clock.

On the 17th, I accompanied Gjerlev to a Catholic church, one of the most beautiful buildings I have seen. If I could depict it with my pen as vividly as I see it in my imagination, you should see it at once, but as this is not the case, I am afraid that you must be content with hearing that it made a very agreeable impression on me, both through its interior and through its exterior, the latter of which had already caught my eye before as it is situated in the vicinity of the beautiful opera house and the hideous library. We stayed together all day and attended Schlegel's lectures together. The hour just be-

fore he had lectured on sculpture and now showed a bust of Göthe, made by the artist Tieck, the brother of the poet, in order to give an example of a masterpiece in this art. Göthe's great genius has manifested itself in all his features, and for this reason his bust, made by a competent artist, must naturally become a true masterpiece. Schlegel said that if he were to say something bold about him, he would say that in his youth he had looked like Apollo as the Greek artists had expressed his ideal, and in his old age he would acquire a similarity to Homer. Schlegel said that if his opponents, who had tried to disparage him, were to sit next to him, their appearance would immediately show their great distance from him. Mr. A. W. Schlegel himself would hardly deserve such a characterization according to his appearance; at least he would lose much of the originality which he hardly feels like renouncing, for he looks very much like Melanchton, according to the portrait that I have seen of this scholar, and, as is well-known, he was among the first who realized the good cause, but he did not have sufficient genius or courage to seek it himself and independently defend it. However, I will certainly not deny that this, in so far as it is a characterization, also fits A.W. Schlegel. Strangely enough, his bold and powerful brother Friedrich really has some similarity with Luther. Schlegel's entire lecture testified to the most excessive partisan spirit, which manifested itself in his constant criticism of the works of living artists, without of course forgetting to praise those who were among his friends. – In the evening we saw *The Marriage of Figaro*, which has here been transformed into a ballad opera and is on the whole rather badly acted. Count Almaviva is played by a certain Mr. Franz, who can so little be compared with Rosing, who plays this part in Copenhagen, as a common dragoon can be compared with a polished courtier. The judge was not played as well as either Gjelstrup or even Knudsen does it in Copenhagen. M^{elle} Eigensaz played the page rather well. Also Figaro was played tolerably by Beschort and his beloved by Mme Eunicke, but the roles seem to be better cast with us at home.

The 18th. In the opera with Gjerlev. Baudessin had got us the tickets, which are distributed free. Operas are performed only during carnival in the opera house itself. During this period 2 operas are performed, each 5 times. The last time the tickets are available

for money for the benefit of the poor. The plays are always Italian. One Mme Marketti, who sang beautifully, excelled here. Dancing is combined with the opera, and in the end a ballet is performed which is far inferior to the ones we can see every day on our stage, a judgement on which several people who have been to our theatre agree. The seats we had got had a very distinguished name, the *Noblesse* loge, but the view from there was very bad as we were not able to see the back of the stage but, on the other hand, saw the wings all the better. Those who had got good seats in this box had arrived at 1 or 2 o'clock even though the play did not begin until 6 o'clock.

On the 19th I took Professor Mattiæ and his student Bernhard to Hermbstädt in order to see his collection of physical instruments. On this occasion I also got to see one or two things which I had not seen before. I was invited to dine with them at the *Ville de Paris*, a splendid public house where the prices are high, and the guests are mostly princes, counts, etc. In the evening I went to the ridotto with Gjerlev. This is a masquerade which is given in the opera house, where you can get in without a ticket if only you wear a mask and a domino. An amusing event recently took place on this occasion. Once free food and drink were distributed. A mask in a blue domino came to the table and ate with a hearty appetite. It was not long before the same mask returned and ate with renewed appetite. When this scene had been repeated 3 or 4 times, they followed this consuming mask and found out that it sneaked out as soon as possible, and the explanation of the whole matter was that the coachmen who were by the coaches outside had rented a domino and a mask together, and that they had used it in turns until they had all had their appetites satisfied. The entire ridotto was extremely *enuyant*, and I should have regretted this expense deeply if it were not that one should see everything in order to have an idea about it. You cannot imagine how painful it was to the ears to be there for a couple of hours in a row. I have never heard such discords, for they all wanted to disguise their voices, and in order to achieve this goal they all whined so piteously that I should willingly have wished myself deaf.

On the 20th, I visited Fichte with Gjerlev. In the evening I went with him to see *Octavia*, a tragedy by Kotzebue. Mme Meyer and

Mme Unzelmann played very beautifully in this; Iffland, who played the role of Antonius, was too old for this and, perhaps therefore, played it unsuccessfully.

On the 21st I spent most of the day with some unimportant visits and was in the Philomathic Society in the evening.

On the 22nd I was at home most of the day in order to study. In the morning I visited Gjerlev, and he visited me in the evening after the theatre.

On the 23rd I visited Mattiæ and Bernhard, with whom I maintain some scientific contact, as they, being foreigners acquainted with van Maarum in Holland and with various famous chemists, can be useful to me where I am going.

On the 23rd, I dined with Gjerlev and a Mr. Finch, who is in charge of the bookshop of the Halle orphanage here. We agreed to take a trip together to Charlottenburg that very afternoon. Charlottenburg is a palace with some adjoining houses where one can get all sorts of refreshments. It is approximately as far from Berlin as Friedensborg is from Copenhagen, but as the road there is rarely good for walking, there are always many carriages outside the gate, Brandenburger Thor, by means of which one can be conveyed at very low cost. It only cost us 12 *sk.* each to get there and approximately the same to come back. As it is winter, there is nothing exceptional there, but it is said to be beautiful in summer. In the evening I went to a concert at a dance hall, whose landlord is called Berger. Gjerlev amused himself little and I not at all. You may not be surprised when I tell you that this was the first time I visited a place of that kind in my whole life. However, I do not regret that I have satisfied my curiosity; for by means of a merchant from Halle, whom my compatriot knew, I got to know many things about the misery of this whole establishment; for this merchant knew several females there who used to be in service in Halle, and one of them, who seemed quite simple-minded, told him a number of things which it is generally advisable to keep quiet about.

On the 24th I spent the day conducting some experiments in my own room.

On the 25th I went with Niemeyer and Gjerlev to the deaf-and-dumb institution, whose director is Professor Eschke. Most of the

pupils were still very young but showed quite good knowledge for their age and condition. Eschke tried in particular to entertain us with a young man who distinguished himself greatly. He could speak fairly well, and although he could not hear, he could still read from your lips what you said, indeed, you only needed to make the appropriate movements with your lips without making a sound, and he was able to understand. When something was too difficult for him, he asked us to write it down on a slate and then answered our questions in writing very sensibly. He also had much skill in definitions so that he explained almost every word of importance from a place in a book which Niemeyer found for him, and when Eschke asked him about the word **to come**, which was also there, he answered after a moment's deliberation that this was one of those words which it was easy to understand, but which could not be defined. He also showed his skill at solving charades which we presented to him. One of my friends, who has recently been there with a party, has told me that there was among them a nobleman who took offence at one of the presented charades and thought that he could show off by asking one of the deaf-mutes what a noble gentleman might be. He answered a person of noble birth. But when someone else in the party asked him if he thought that gentle and noble were the same, he answered, no, gentle was someone who acts well, noble was someone who is **gevont** (has a **von**). However much this institution, so important to mankind, amused me, I still found it offensive that what a couple of the pupils had written on their slates in order to give an example of their style and their handwriting contained so much praise for Eschke. It may well be that he has no part in this, but I think that he should try to prevent this as it can easily be misunderstood. But it really seems that the good man possesses a great deal of vanity, which was also shown in his attempt to disparage the Leipzig deaf-and-dumb institution in comparison with his own. He told us that most deaf-mutes thought that everybody had learnt to speak in the same way as they had, but he said about the oldest pupil that he had been fully informed of his condition, but that he was quite good at consoling himself, by saying that one of the advantages of his condition was that he need not be disturbed in his sleep. In the evening I met Eschke again in the *Resource*.

The 26th. Galvanic experiments in the morning. I had dinner and spent the rest of the day with Gjerlev. We went to the deer park, which is very close to Berlin. The day was very lovely, and we had coffee on a balcony with a beautiful view.

To Professor Manthey:

Berlin, January 26th 1802

I would already have answered your most welcome letter of January 8th if I had not hoped as you did that I would get your letter of November 28th by writing to Albrecht. As soon as I had received your letter and found that I could not get the post office here to proceed further with the matter, I wrote to Albrecht and asked him to send me the letter, whose date I supplied, or a statement from the post office that it had been sent to Berlin. He has had a certain Mr. Nauck answer me that his duties did not permit him to keep a record of every letter or to consult his cards for a ¼ year, but that I could be certain that all letters which passed through Hamburg were handled properly. I have now written to him again and urged him more strongly, but as it was necessary for me to demonstrate that he was wrong in order to present the case coherently, I fear that I shall receive no reply. I believe that by bringing the matter before the courts one can demand the letter from the relevant party, whether it be the Hamburg or Berlin post office if onlyone has a statement from the post office in Copenhagen; therefore Albr. has to prove that he has sent it, and the post office in Berlin has nothing left but to deliver it. Therefore, if you would send me one, you would do me a favour; for I both wish to receive this letter and fear that it may fall into the wrong hands.

The approval which you continue to give to my efforts in my travels is very dear to me. That you approve of my plans for the future is, if possible, even dearer as it is not only me that this will affect.

I will postpone the letter which you can show to Schimmelman until next time as I expect then to be able to report some scientific news which perhaps could make the path even smoother. I would like to tell you some of these things at once, but that would require a letter as long as the one I intend to send you next time.

Assessor Rose will take 2 ounces of musk from you and will try to find a market for more, but he noted that it was inconceivable that someone who did not know you personally would take something without having seen samples or knowing the price; but when he has received his portion, which he desires as soon as possible, he will show it as a sample. He seems to care greatly about quality.

I have repaid the 20 *Louis d'or* to Schickler[29], who made no difficulties.

Roesch has received the French earth, and I will remind him about the [subscription] as soon as I see him.

Hermbstädt sends his regards and asks you to remember the minerals that he wrote about.

Respect and friendship

Ørsted.

Continuation of the travel journal:

On the 27th. I went with Gjerlev to see the comedy *Tricks against Tricks* or *Open War*[30] and *Sulmalle*, a ballad opera by Herkloz. After the play we stayed together until late as it was his last night in Berlin. I have been very pleased with his company during the few days he was here, and I part with him reluctantly.

On the 28th, the birthday of the Crown Prince[31], I was invited to dine with Selbye, together with Darbes. I find that Selbye improves on closer acquaintance, and I regret that so far I have not sought his company more. After the meal, which did not end until after 5 o'clock, I went to the assembly of the academy, which was public that evening, and there I saw Klaproth make galvanic experiments with plates of 5 inches in diameter. There was nothing new in these

29. Gebrüder Schickler, banking house in Berlin, named after Johann Jacob Schickler (1711-75) by his sons.

30. *Guerre ouverte, ou Ruse contre ruse* (1787) by Antoine Jean Bourlin known as Dumaniant (1752-1828). The play was performed on January 27, 1802 at the *Nationaltheater* in Berlin and was followed by *Sulmalle*, a ballad opera with music by Bernhard Anselm Weber (1764-1821) and text by Karl Alexander Herklotz.

31. Crown Prince Frederik of Denmark (28/1-1768 to 3/12-1839), later King Frederik VI (1808-39).

experiments, which were simply a repetition of those of van Maarum.

On the 29th, on the occasion of the King's birthday[32], I dined at Baudissin's, where several others, mostly half-Danish as for instance people from Holstein, Germans in Danish service, etc. were present. The company was stiff and uninteresting, the conversation mainly concerned court preferments, family connections, and the like. – When the party was over, I went to see Fichte in order to sign up for his lectures. He had estimated the payment for these at no less than 4 *Friedrich's d'Or*, almost 22 Rd., and although it was hard for me to spend that much on something which I had not really considered in my estimate, I would not miss the beautiful opportunity to get to know the system of this great genius. I did not find him at home but spoke to his wife, who told me that her husband did not want me to pay more than 2 *Friedrich's d'Or*; he found it unreasonable to ask the fixed amount of the true student, but he had charged such a high price for the Berlin dilettantes.

The 30th in Hermbstädts laboratory. In the evening I had a visit from one Schulz from the Department of Mines, who seeks every opportunity to be of service to me and, among other things, has mice caught for me for my galvanic experiments.
Your
Christian.

On January 31st I visited **Rose**, who was just on his way to a Viennese mineral dealer Murrerweck so that his sons, who are zealously studying mineralogy, could select some minerals. I came along because I had not yet seen his selection, and it was worth my while because the mineral dealer wanted to show everything to Rose, who had previously purchased a good deal from him. Rose's wife arrived a little later and so greatly shared the interest of her husband and children in these objects that I became quite fond of her. Later we all strolled together on Unter den Linden. In the afternoon Weiss and I visited a certain Mr. v. Rettel, where I was so *ennuyé* that I shall not go back there soon. I spent part of the evening in the *Resource*.

32. King Christian VII of Denmark (29/2-1749 to 12/3-1808).

February 1st. Hermbstädt's laboratory. Today I heard Fichte's lectures for the first time. The rare talent which he possesses for presenting his thoughts makes his lectures doubly interesting, and even if I never learned anything from him except some of the tricks whereby he knows so well how to rouse and maintain the attention of the audience and awaken in them impressions which are not so easily expressed in words, then I would already be rewarded for the time I spend on this.

The 2nd. Last Sunday Rose had invited me to dinner today so that he could then take me to see the greenhouses belonging to Bouché and others outside one of the gates. Many from Berlin come to these greenhouses to drink coffee in the afternoon. It is really extremely pleasant in the middle of winter to find oneself among all sorts of flowering trees and plants, which otherwise can be seen like this only in summer in warmer climates, and enjoy this pleasure in the company of many other people of both sexes.

The 3rd. Hermbstädt's laboratory.

The 4th. Hermbstädt's laboratory. In the evening in the Philomathic Society, where Professor Erman read an interesting paper on galvanism and demonstrated the relevant experiments.

The 5th. I visited Selbye. We were so deep in conversation that I spent the entire morning with him, and I found his company more interesting than I had ever found it before. Already before my arrival, he had sealed an opera ticket which he wanted to send to me. Using it, I attended the opera *Tigranes*[33] in the evening. However, I came late because I first wanted to hear Fichte, whom I could not persuade myself to miss.

On the 6th Selbye took me to a ball, called the Colonial Ball, where a great many diplomats come. There I made the acquaintance of a merchant Köppen from Copenhagen. We were all three spectators and not participating members of the party, except for the fact that we ate there.

On the 7th I studied and wrote letters. In the evening at a party at the house of Privy Councillor Schulz. I was invited by his son,

33. A number of composers, including Alessandro Scarlatti, Vivaldi and Gluck, have written operas about this Armenian king.

whom I have already mentioned in my earlier letters. Schulz has a very beautiful daughter, who also seems to be talented. I had the opportunity to talk only a little with her as the party was so numerous that she had to divide her attentions among too many.

To Anders Sandøe Ørsted:

Berlin, February 7th 1802

I am at present enjoying a happiness which you may be close to envying me, I am listening to Fichte himself lecturing on his scientific theory. As I have not yet heard him more than 5 times, I can only speak about his delivery, and this is quite excellent. It is a true pleasure to hear how he develops everything with the highest degree of clarity and certitude, how he adds fire and life to this, how he can arouse and maintain attention and interest in the most abstract subjects, in short, he is a true master in the art of communicating his thoughts to others. There is hardly a fairly reasonable objection which he does not counter, hardly a thought that he can anticipate in his audience without knowing how to satisfy it. I have often had doubts, objections, etc., during his lectures which he solved at the very moment when they arose in me. After the lectures he gives the audience the opportunity to ask questions, but so far this has been of little consequence. The doubts and the questions which have been put before him there have been answered with the greatest certitude and clarity. A. W. Schlegel, who lectures on aesthetics this winter, is also in the audience. Fichte had put the price of his lectures at 4 *Friedrichsd'or*, almost 22 Rd., but he would only take 2 from me and explained that he had only set the higher price for the Berlin dilettantes. When I have heard some more lectures by him, I shall inform you of the most extraordinary parts; I have already received much enlightenment from the ones I have heard.

I have seen Nicolai at several parties, but I have not yet spoken to him. He is also reasonably aware of my existence, for he has mentioned to Gjerlev, who was here recently, that he had a compatriot here. I hope that his notorious vanity will make him resent it that a stranger who attends the same parties as he takes so little notice of him. From this you see that I cannot give you any news about him

except for his appearance. This is abominable. As for his stature, he looks almost to perfection like Odin Wolff, except for the hump. Also his face has something in common with his, except that it seems even more loathsome to me.

I have recently seen an exceedingly well-made bust of Kant. He does not look so *Risbrighian* as in the portrait in the Bourse. He possesses to a very excellent degree Gall's organs of perspicacity.

A short time ago, A. W. Schlegel adapted one of Euripides' plays for the theatre in Weimar. Böttiger wrote a review of this, in which he sought to disparage Schlegel's work. Göthe heard about this before it was printed and immediately wrote to the editor of the journal which was to publish it that if he printed anything by that scribbler and profit-monger which was aimed at disparaging one of the greatest products of German genius, he would immediately resign from the management of the theatre. He also wrote to Wieland, asking him not to accept it in his *Mercury*. When the bookseller showed Böttiger Göthe's letter, he crossed himself and gladly allowed his scribbling to be suppressed.

I thank you for the *L.E.* you sent me and for *Siofna*. There seems no doubt that our friend's contributions are the best, but this is not really much to say in their praise. The awkwardness and the vulgarity of Horrebov, Lundbye, and the whole business are beyond description. Whoever can find, in the 6 pieces here by these gentlemen, a new thought or merely an expression which is not completely trite must have a greater talent for discovery than I. The poems by Kruse and Staffeldt at least have the advantage that they contain ideas which may not be entirely new but still less trite; but it is a great misfortune for them that almost all their works consist in an endeavour to express thoughts which they have found beautiful. Under such dubious circumstances, we must give full credit to Rahbek since he, at least, repeats himself, his eternal *Spectator*. Sander has delivered two beautiful lines to his muse and has thus paid for his right to call it *To Love*. As for the rest, you will easily grant me that Frankenau's is the best, and that none of them are excellent. On the whole, we probably agree on our judgement of this collection, but I cannot help talking to you about it as it amuses me or rather is necessary for me to vent my indignation over these sinners.

A publisher is sorely tried by all such trash unless, like Rahbek, he has a *Spectator* or a *Minerva*[34] to pack it into, for it is not possible to refuse the poetry of so many respectable people without making too many enemies. Thus Øhlenschlæger has not supplied *Siofna* with his most costly treasures. Among other things, the conversation between Wilhelm and the flowers, with all its originality, seems to me to be a poetic frivolity. Nor do I know whether Wieland's long tale was worth the trouble which such a good translation must have cost.

I think it will amuse you to hear that I have found a scientific friend here in Berlin. It is a Dr. Weiss from Leipzig, whose brother has written about philosophy. He combines the most ardent zeal for natural science with a cultivated and free genius and has many fortunate ideas, but it is a pity that he does not test them in experiments. We are together almost every night and communicate our ideas to each other.

At present I am working on an exposition[35] of Winterl's *Prolusiones ad chemiam seculi decimi noni*, a book which is rich in genius, but, with the exception of Ritter, whose attention I directed to it, I know no chemist or physicist, neither in Berlin nor elsewhere, who really knows its contents. Rose and Ermann have expressly asked me to prepare such an exposition for the Philomathic Society. Besides, I have made plans for several other tasks, especially some experiments which should reveal to us a new force which is related to ideo-electric bodies as galvanism is to electric conductors. I shall soon tell you more about this.

There is no longer any need to put Albrecht's name on the letters as I have a fixed address. Besides, no more letters should be addressed to him when I resume my journey as he is a muddler. I have not received many of the letters which have been sent to me at his address. Regards to Øhlenschlæger, Bornemann, etc.
Your Christian.

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34. *Den Danske Tilskuer* (The Danish Spectator) (1791-1806), a general and literary journal edited by Knud Lyne Rahbek. *Minerva* (1785-1807), Danish journal edited by Rahbek and Christen Henriksen Pram (1756-1821).

35. *Materials for a Chemistry of the Nineteenth Century* (1803), KM I, pp. 133-210 and JJK, pp. 120-65.

To Professor Manthey:

Berlin, February 8th 1802

The advantages granted to me already at the beginning of my stay here in Berlin have been increased daily. Partly thanks to your letters of introduction I have now established almost all the connections which could be of any scientific use to me. I have visited the porcelain factory several times, and with the help of Richter and Roesch, who both show me every possible friendship, I have seen almost all that I could wish and have the permission to go there more often. I have the opportunity to conduct any experiment I wish in Hermbstädt's well-appointed laboratory. As he has to make many technical experiments in his capacity of factory manager, I often see what is otherwise kept more or less secret. I have seen most of the experiments in the art of dyeing as he is presently engaged in lecturing to dyers and writing a text-book on the art of dyeing. He has conducted numerous experiments with hitherto unexamined mordants, some of which he has entrusted to me. He has also entrusted me with an investigation of several alum samples, whereby I obtained a result which was rather important for practical purposes, namely that one of the samples, which was sold as a medium quality, was far better than a few others that were more expensive. Before long, H. also intends to conduct experiments on a new composition of porcelain glaze, in which he has promised me that I may take part.

I am also eagerly making experiments on Winterl's chemistry, which, if it is verified, will have the greatest influence on technical as well as theoretical chemistry. People here in Berlin have quite generally failed to appreciate him and believed that everything could be explained by his use of impure materials. I have defended him and shown that the coherence and the harmony which are found in his entire work could not have its origin in confusion. Most chemists have not read W.'s book as it is written not only in Latin but in very poor Latin and besides has many errors in the execution. Therefore, several naturalists here have asked me to write an exposition of it for the Philomathic Society, a task which I have almost finished already. I have also formed a group which is to test W.'s system through ex-

periments. It is true that I have already begun this myself, but as he has described several hundred experiments, it exceeds the powers of one man to repeat them in a short period of time. Thus **Rose** undertakes to conduct the experiments on andronia, **Richter** will investigate whether it is true that alkalis can be deadened, and I undertake the same thing for the acids. We will persuade **Simon** to investigate deoxidized vital air.

I think that I have discovered a strange law for the conductive power of electricity in bodies. I find that, among the **fusible** solid bodies, the **ductile** are **good**, the **brittle**, on the other hand, **poor** conductors, whereas, among the **liquid**, the **non-combustible** are **good**, the **combustible bad** conductors. It would go beyond the limitations of a letter to exhaust this matter, so here are just a few striking examples. Metals, the most ductile bodies, are also the best conductors of electricity, whereas they insulate as soon as they have lost their ductility through oxidation. Glass, a brittle body, does not conduct until it begins to melt at a high temperature and thus has lost its brittleness. Resin, wax, sulphur, etc. also belong to this class, but as far as the investigations of these are known to me, they do not conduct when fused either, which is in accordance with the law that liquid combustible bodies do not conduct. As the investigations which we have of conductors of electricity are lacking in completeness, it seems possible that many apparent exceptions to these laws may be found, indeed, it would be possible that I could be found to have failed entirely, but it is certain that there is very much which speaks in favour of this. It might not be impossible that there existed a similar contrast between two heterogeneous **brittle, fusible** bodies and a **combustible** fluid as exists between two metals and water or some other non-combustible fluid, and this effect would thus be the same for the former class of bodies as galvanism is for the latter. One of these days I shall conduct experiments on this.

No matter how much circumstances favour me, and no matter how much good fortune I have had in winning the friendship of men who could be useful to me through their knowledge and through their position, I do, however, feel one obstacle very severely, i.e. the reduction which I am obliged to impose on myself for lack of a sufficient travelling grant. If it were only a question of liv-

ing, there is no real difficulty as I am able, with proper economy, to get what is strictly necessary; but hardly anything is left for scientific expenses, and yet you easily understand how important that must be to me in order to profit duly by my journey. How pleasant and profitable would it not be to me, for instance, if I could take private lessons with this or that naturalist who excels in detailed knowledge of a certain subject. You yourself know that the person who has made some progress in science learns nothing from public lectures as they are intended for beginners; moreover, it often happens that in some place lectures are not given on what you want to hear while you are there, and besides, in each case such lectures last too long for someone who has to spend a certain period of time on travelling. If I myself possessed something to contribute, I should never complain about this; however, as I not only lack this but have neither an assured livelihood nor even a certain prospect of paying if I received an advance, I really have cause to worry. How I shall obtain the many things which are necessary for me as a chemist when I return to my country, I shall leave unanswered at present. I merely ask you to add this proof of friendship to so many others and to plead my cause so that I shall fairly soon receive the royal allowance which I applied for before I set out on my journey. Each day is precious to me as the time of my departure is fixed. The detailed reasons why support is necessary for me have already been set forth in my application, which I know that you have read and recommended.
Yours most respectfully
H.C. Ørsted.

To Professor Manthey:

Berlin, February 9th 1802

I hereby transmit the letter which I hope you will have the kindness to show to Schimmelmann. I think it not a bad idea that I have arranged it so that it looks as if it were not meant to be thus shown. It is true that this has made it somewhat longer, but I believe that if he agrees to read it, he will do so regardless of a couple of lines more or less.

I wonder whether it is in order to ingratiate himself that Pfaff has told us in *Bibl. for Phys. og Medicin*[36] that the French get farther with their atomistic system than those whom he pleases to call transcendental minds with the dynamic. I confess that it is impossible for me to see what the atomistic system explains before it has presupposed a great many fabrications. I ask the atomist why a substance has extension, and he answers: because the atoms of which it is composed have. I want to know why matter is divisible, and the answer is because it is composed of parts. Why is matter impenetrable? That is easy to explain, because the atoms have impenetrability. In the same clever way they deal with gravity, cohesion, etc. The atomist cannot even explain very clearly where this expansive elasticity comes from, but we have as many empirical proofs against him as we have gases; for it is of course not due to the atoms, which cannot be compressed at all, that matter can first be **compressed** and then expand. The pores can explain the compression but cannot possibly explain the subsequent expansion. It cannot come from the caloric either; partly because it is inconceivable that the caloric should prefer entering the pores of the body (e.g. the gas) from which it was expelled to staying where it was, and partly because considerable heat must be noticed at the compression of a gas and intense cold at its expansion, which, however, only occurs to a very small degree, compared with what aqueous vapours produce on their liquefaction. The same is true of the chemical operation. Why should sulphuric acid prefer being in the pores of potash to being in those of alumina, etc. On the effect of points of contact, the French explanation of which Pfaff admires, Schelling has given an explanation, which is certainly more ingenious if not more correct. Mr. Pfaff should have known all this as it is fairly well-known, but once a German professor has gone so far in his admiration of the French that he announces in the learned journals that he is translating such a popular work as that by Guyton-Morveau on the purification of air, under the supervision of the author, then one may expect all contempt for his own nation and blind admiration for foreigners. I

36. *Bibliothek for Physik, Medicin og Oeconomie* (1798-1800) and *Nyt Bibliothek for Physik, Medicin og Oeconomie* (1801-06).

would gladly write a few pages for *Bibl. for Ph. og Med.* for the enlightenment of this good man, who thinks to honour the great experimental artist Volta by considering him to be a Franklin (NB. as a physicist and not as a republican), but I fear that it could have bad political consequences for me if I wrote about *Naturphilosophie* again.

More very soon. Regards to your wife and your good Ludvig.
With respect and friendship
Ørsted.

Continuation of the travel journal:

The 8th. I visited Richter to ask him to take part in the experiments on Winterl's chemistry. He was willing but asked me to give him a description of the experiments he was to conduct, stating that the book being written in Latin presented difficulties for him. I would not have thought that this could be any serious discomfort for Richter. As I have sent off 7 letters today, the rest of the day provided me with plenty to do.

On the 9th I performed some galvanic experiments with frogs which Erman had given to me. In the evening I visited the playhouse with Karsten and Weiss. The plays were: *The Vinegar Merchant*[37], a mediocre product but one in which Iffland plays the vinegar merchant masterfully, and *Liebe und Treue*[38], a ballad opera which consists of some songs by the best known German poets, which are connected by indifferent dialogue. The music was charming, and most of the singers were good. Mme Unzelman played a half-grown boy and acted with much perfection.

The 10th. Hermbstädt's laboratory. Weiss and Karsten were with me in the evening. I read them Mendel's translation of my treatise on the metaphysics of nature[39] as I had the manuscript with me for inspection. I thought it best to read it aloud and to discuss it with Weiss in order best to discover the errors in it.

37. *Der Schubkarren der Essighändlers* (1775) by Louis Sébastien Mercier (1746-1814).
38. A ballad opera (1800) by Johann Friedrich Reichardt (1752-1814).
39. *Ideen zu einer neuen Architektonik der Naturmetaphysik nebst Bemerkungen über einzelne Theile derselben*, published by M. H. Mendel, Berlin (1802). KM I, pp. 79-105.

On the 11th I performed galvanic experiments in the morning. I was in the Philomathic Society in the evening. I left Fichte so late that I only heard the end of a paper which Bendavid read about solidity and fluidity. The parts I heard were delivered miserably, and Weiss, who had heard the entire paper, assured me that neither the delivery nor the contents of the previous part had been better.

On the 12th, I made the changes which I wanted to make in my treatise on the metaphysics of nature. At Fichte's house I met a Dr. Höyer from Sweden, who had been in Copenhagen some years ago and visited me there. We spent the evening together at his house, talking about Paris. Like all others who are mere philosophers, he has returned very dissatisfied from Paris. They have all heard a little chemistry there but have allowed themselves to be discouraged at the beginning because the French build on such poor philosophical principles.

The 13th. Visited by Edelkranz, who invited me to a dinner party which he hosts on Sunday. I spent the rest of the morning with Weiss in Hermbstädt's mineral collection. This afternoon I began to learn how to blow glass in the company of W. They have here a non-commissioned officer, by the name of Faller, who possesses great skill in this, and who asks only 1 mark an hour for instruction. I consider it extremely useful to be able to make certain little parts of chemical and physical instruments oneself since otherwise one must often pay for such things three or four times as much as they are worth. Today I also attended Bode's lecture on astronomy and found that he treated the matter much more thoroughly than Bugge even though he has ladies at his lectures. His delivery is far from as good as that of our Bugge. In the evening I went with Karsten to see Weiss so that we could join each other in reading once more Kant's metaphysics of nature. The book is so short that this can be done in 3 or 4 evenings. The purpose of this is that W. and I were going to try to agree on a great many points about which we have so far argued with each other. Karsten is a superfluous person, who mostly plays the role of the listener or at most that of the reader.

Your

Christian

On the February 14th I visited Rose, whom I later met again for dinner at Edelkranz's along with Klaproth, Hermbstädt, Bode, Richter, Karsten, Wildenow, Rudolphi, a Count Podevill and the Swedish ambassador, whom he had all invited to a kind of farewell party. He showed us a Papinian engine, made after his own improved design, which was very interesting. **Kant's** metaphysics of nature with **Karsten** and **Weiss**. A visit from Schulz.

The 15th. Hermbstädt's laboratory. A visit from Höyer.

On the 16th I again wrote a great many letters to Copenhagen and other places. As I believe that the 16th is your birthday, I celebrated it with my friend Weiss, whom I had invited for that reason.

To Anders Sandøe Ørsted:

Berlin, February 16th 1802

Although Fichte's excellent delivery does not put his system in a clear light so quickly as I had expected, I can, however, give you some intimations, which may not be new to you, but which have still given me much light and raised my expectations for the future. The absolute must be imagined with two attributes, namely, **the absolute** is **simply** what it is, and **because** it is. Concerning the first he explains it thus in other words: The absolute is something **in itself resting**, a **constant being** (Sein). The second he expresses by the word **freedom**. As this absolute cannot be **for** something else, it must be **for itself**, and this must be imagined as the most intimate fusion of freedom and being, and this is knowledge proper, and therefore there is a duplicity in all knowledge; all knowledge is a union between separates, and therefore we cannot arrive at anything simple in our knowledge, but everything is divisible without limits. He himself pointed out that it seemed contradictory that he went beyond knowledge in his system, but he promised to solve this contradiction later. At the moment he did not want to say anything else about this absolute, and this was to remain merely as an intimation of a better understanding of what was to come. Here he just wanted to speak about absolute knowledge. In this, too, freedom and being must be fused, and now two directions were possible in

which these could pass into each other, namely, from freedom to being or from being to freedom. The first point of view is the idealistic, the second the realistic; but neither of these is by itself that of the theory of science, which combines both of them in absolute knowledge.

The system of transcendental idealism that Schelling has established as the antithesis to his *Naturphilosophie* is far from being a theory of science. In it he maintains only one point of view. I asked Fichte if I had the correct understanding of Schelling's theory, to which he replied that it was in some sense correct and only failed in that Sch. was dominated by this point of view and had not addressed the absolute at all. On the other hand, F. is in complete agreement with me regarding another judgement of Schelling's philosophy. I believe that the highest system, which Schelling has now begun to present in the 4th number of his *Zeitschrift f. speculative Phys.*, is merely logical and is not based on intuition in the same way as the theory of science. But such a system can only be circular, just like the theory of science, with the sole difference that it certainly cannot justify it since a collection of logical statements proves nothing if it is circular. I am forced to speak about Schelling's system in a very doubtful tone since I have not had the opportunity to study it properly, only rather superficially, and I have not finished reading his transcendental idealism and the 4th number of *Zeitschr.*

The claim that Fichte's phil. is one of the century's greatest tendencies does not seem to be exaggerated; for not only the system but also the way of philosophizing is the complete opposite of older works. I do not believe that one can really praise Schelling's ph., for if I ignore what he has taken from F., I do not find much of importance which has not been thought by other clever minds.

That I have only told you so little about Fichte's principles comes from the fact that I realize that you know what he has said before well enough to understand it. You will easily see that he now chooses completely new terms, but he himself maintains that his system is the same as before, and I also believe that it essentially is, in so far as he presupposes absolute knowledge; I do not know whether he has talked about the **absolute** κατεξοκην anywhere in

his *Grundlage zur Wissenschaftslehre*[40], but perhaps this is merely because I do not know it sufficiently well. However, as soon as possible, I shall write to you in more detail about what he has said in order to discuss with you, as far as it can be done in your absence, a topic which has long interested both of us. – Here only a few more words in explanation or rather in comparison between the new and the old. The way or the direction from being to freedom is the way of consistency. The idea there is bound to a certain order (hence time). In the direction from freedom to being (the self-limitation of freedom), freedom floats unbound above every point, and therefore neither of these determines the other any more than it is, conversely, determined itself (hence space). This, too, is merely an intimation, which Fichte will elaborate on later, but it will be clear to you whether he deduced time and space in the same way before. F. considers what he has said in his *Ethics* on the most important points of transcendental philosophy to be the most illuminating that he has written on this.
Regards to our Øhlenschlæger.
With brotherly friendship,
Christian.

To Professor Manthey:

Berlin, February 16th 1802

Although I have very little time today, I must take the liberty of reminding you of a few circumstances which I forgot in my previous letter. Ranøe's death has left a vacancy in the medical faculty which will undoubtedly be filled by Münster. On the same day that M. got his position, Skjellerup was also appointed ahead of M. and I after them both. If M. is promoted, it will probably be necessary to promote S. as well because of seniority, and if this happened, it might not be impossible for me to gain some advantages if someone pleaded for me. I leave it to your friendship to judge what might be accomplished in this regard.

40. Foundation of a Theory of Science.

Legal Councillor Albrecht has again answered me regarding your letters of Oct. 31st and Nov. 28th and said that it was not sufficient for him to know the date, but that he must also know the number. He uses such evident evasions. I will write to Jena today in order to hear if they, contrary to my expectations, might be found there. If one could make the Copenhagen post office certify the sending of these letters, it would not be necessary to make so much effort but rather force him to say where he had sent them.
Respect and friendship
Ørsted.

Unexpectedly, I have a little extra time. I will use it to speak of my travel plan for next summer, a plan which has not really matured, but which I still present for your judgement as my friends wish me to make a decision soon. I believe it is your advice that I should travel from Berlin to Dresden and from there to Freyberg. My friend, Dr. Weiss, will accompany me there and with me will undertake a private course of study with Lampadius of metallurgy as it is used on a large scale. As he will thus be able to skip all that one might call prerequisites, with which I believe we are both endowed, this is not likely to take more than a month or six weeks. A young and apparently talented mineralogist, Schulz, has suggested that he and I take a mineralogical walking tour in Böhmen and Mehren. This would only take a couple of months, after which we could arrive in Brünn [Brno], where Count Salm has invited me. He would go with me to Wien, from where I could visit Winterl, who is only some 20 miles away in Pest. This plan strikes me as quite beautiful; but the question is whether I, with the little mineralogical knowledge I have gathered, would get much benefit from such a journey, whether I might not at least make better use of my time by choosing another route, especially as it might easily take 5 or 6 months so that I would not get to Paris before the winter. Of course, the result of Rose's, Richter's and my studies of Winterl must also have an influence on this. In short, I cannot yet make a decision, but if you would inform me of your thoughts when you write to me, it would give me great pleasure. I have always benefited from your advice.

Continuation of the travel journal:

The 17th. Hermbstädt's laboratory. Kant's *Naturmetaphysik* with W. and K.

The 18th. Hermbstädt's laboratory. Philomathic Society, where Erhard read a paper on the systematic classification of mental powers.

The 19th. Hermbstädt's laboratory. Kant's *Naturmetaphysik* with W. and K.

On the 20th studied at home.

On the 21st I attended Schlegel's lecture with Schulz. The rest of the day I studied at home.

The 23rd. Hermbs. lab. Paid a long overdue visit to Herz. I found only Mme Herz at home and conversed with her about physics and poetry. She complained that so little of the latter published lately is worth reading and said that one could do nothing but seek one's refuge in the Greeks. However, I greatly doubt that she really understands that language so well that she can read its authors with benefit. In the evening Kant's *Naturmet.* with Karsten and Weiss. This was the last such gathering. K. and W. wanted to continue, but I declined since it takes too much of my time.

On the 24th I was in Hermbstädt's lab. and later with Höyer at Schlegel's lectures. This time he dealt with harmony in language and gave various principles for its judgement, which I had previously read in a paper that he had written on this for the Athenæum. In the evening I visited Pastor Hermes and was met with appropriate ingratitude because I had not been there for such a long time.

On the 25th I visited Ermann, who lent me platina wire for some galvanic experiments. He told me a good deal about his experiments and said that he had a theory regarding the Voltaic pile. On the same occasion I visited Schlegel, who lives nearby, and had a couple of hours of interesting conversation with him. It is now the fashion here that all true geniuses should also understand physics, so Schlegel is also interested in it. As he not only has a good mind but also knows some of the greatest minds of our time, one at least gets a number of interesting poetico-physical ideas from him. I also met Military Councillor Schütz, who has written some verses.

Schlegel read something from Schelling's latest journal to us and pointed out a number of puns. In the evening I was in the Philomathic Society, where nothing of importance occurred.

On the 26th I studied and walked. In the evening I visited Assessor Roesch. The company there, a man and his wife who were somehow related to R., was not very *amusant*. I had to play Speculation until midnight and won 2 *skilling*.

On the 27th I studied at home and galvanised at Herz's. In the evening, or more correctly at night, I visited the astronomical observatory, which Bode had once promised to show me. On this occasion I saw the new planet.

On the 28th I studied in the morning and spent the afternoon walking to Lichtenberg, a village near Berlin. In the evening I went to the *Resource* early and spent the rest studying.

March

On the 1st I spent some of the morning with Rose. In the afternoon I galvanised at Herz's, but without any scientific benefit. I had to show a number of ladies what galvanism can do, and thus time passed.

The 2nd. In Hermbstädt's lab. At Herz's to see the result of a galvanic experiment I had started yesterday.

The 3rd. In Hermbstädt's lab. Visits to Rose and Herz. In the evening I was invited to Hermbstädt's, where I saw many of Berlin's doctors assembled. Reil was also there, and the party was really in his honour. Meyer, Grappengiesser, Herz, Assessor Rose and others were there. I made the acquaintance of 2 pharmacists, Si[t]z and Möller, who are travelling so that I may run into them again. I also made the acquaintance of a Dr. Senpf from Halle.

The 4th. Studied. In the Philomathic Soc.

The 5th in Hermbstädt's Laboratory.

6th. Studied.

7th. Sunday. Studied, visited Dr. Höyer, where I made the acquaintance of a Dr. Marburg, who seemed to be a doctor with very mediocre knowledge. In the afternoon with Bendavid to the deer park, where I also met Prof. Wrede. In the evening I went to the Kränzchen at Herz's house. There I was in the company of another

of Fichte's listeners, who assured me that Fichte's system was meaningless. He is a Moldavian who does not speak German (although good French) and usually sleeps through F.'s lectures. When we left F. today, he asked me what F. had said, and where he now was in his lectures. I told this to Mme H. and others of the company, and they were amused by his insolence.

The 8th. Visited Edelkranz. In Hermbstädt's laboratory.

The 9th. In Hermbstädt's lab. I visited Hermes in the evening.

The 10th. In Hermbstädt's lab. Listened to Schlegel, who lectured on mythology.

The 11th. In H.'s lab. In the evening in the Phil. Soc., where a mint assistant Loose read a paper on how to distinguish counterfeit coins from real ones.

Your
Christian.

March 1802.

On the 12th I visited Rose and was with him in his laboratory, where he worked all morning. Studied for the remainder of the day.

The 13th. Hermbstädt's laboratory.

On the 14th I studied. Today Schlegel lectured on mythology and on its influence on the poetic treatment of physics. He had told me about this before, so I went to listen to him. However, what he said about this was not as satisfactory as what I have otherwise heard from him in conversation. Furthermore, I find that when I want to hear a good lecture from him, I merely need to visit him and turn the conversation to the subject about which I want to know his thoughts. Then he talks about it as extensively as in a lecture and in almost the same manner which seems to have become characteristic of him.

On the 15th I spent most of the day dealing with the following day's mail, which was quite extensive.

On the 16th I visited Richter, with whom I spent most of the morning. After dinner I was with Weiss and Bendavid in the deer park. Later I visited Renard, the engineer.

On the 17th and 18th I excerpted various new material which was necessary to me, and in the evening of the 18th I was in the Philo-

mathic Soc., where Privy Councillor Rosenstiel was to read a paper but neither came nor informed the Society that he had been detained.

On the 19th I worked in Hermbstädt's laboratory and excerpted an article from *Annales de Chimie* that dealt with a subject on which I was conducting experiments.

The 20th. The same. In the evening I went to the playhouse to see a performance of Lessing's *Nathan the Wise*[41], which Schiller has revised. The spectators do not seem cultured enough for this play. It was scarcely possible to hear the actors for the talking of the spectators. I left one part of the stalls after the other in order to find quiet but all in vain. When the 2nd act was over, I said in German to Dr. Höyer, with whom I otherwise always speak Danish, that I found it remarkable that it was impossible to find a quiet place in the Berlin theatre to hear *Nathan the Wise*. As most people are unanimous in praising this play even though they may not like it very much, the worst chatterers were ashamed and moved away, and the others were more quiet. Bendavid has told me that when he was there before, the spectators were also talking.

On the 21st I was invited to Rose in the evening and met Dr. Meyer and his wife, the actress, who had played one of the principal parts yesterday. In addition, the party consisted of Hermbstädt, Wrede, Weiss, an Apothecary Tieman, Rose's brother-in-law, and others. Rose's circle is always intimate and friendly. It is like being at home, and all belong to one family.

The 22nd. In Hermbstädt's laboratory.

The 23rd the same. Hermbstädt performed experiments on a new kind of cochineal, which turned out not to be good. The method was quite simple, and the experiments not very accurate; but for all that I very much enjoyed seeing how a practised chemist handles such matters. In the evening I was in the Society of Naturalists at Karsten's. K. showed some beautiful fossils, otherwise nothing remarkable.

The 24th in Hermbstädt's lab. Studied.

The 25th. The same.

41. *Nathan der Weise*, drama from 1779.

The 26th also in Hermbstädt's laboratory.

On the 27th I visited Rose. I went from him to Scherer and had with him a scene such as I have never had with any scholar. If I had used the same vulgar language as he, we would have ended up in the most perfect brawl one could imagine on Gammel Strand[42]. He turned the conversation to *Naturphilosophie*, and although he knew I had written about it, and although I now defended it with all modesty against him, he declared it to be stupidity and unreasonableness and continued with similar expressions. When people begin in that tone, I usually do not lose my composure because I can see my advantage. I tried merely to answer every point without using his vulgar expressions. After he had said so much against philosophy, he said, "Perhaps it is my fault. Gall says that I lack the metaphysical organ." Yes, I said, Gall is not wrong about that. His entire argument was that we could know nothing except what experience had taught us, against which I offered mathematics, but he would not accept this, and he knew nothing of the reasons which the thinkers of all time, not just the modern ones, have given for this. Therefore I told him that it would best for him to ask someone whom he knew to have a thorough knowledge of mathematics. He naturally declaimed vigorously against the introduction of the dynamical system in chemical text-books, and I allowed him that it really did have the disadvantage that it motivated people who understood nothing about it to render judgement in this matter. We finally parted happily and well without abusing one another, but after I left it started again with even greater force, as the younger Karsten, who was there, has told me. He apparently amused himself for more than an hour and a half heaping the most vulgar invectives upon me and my friends. Among other things, he asked Karsten whether I was a success in Berlin, and when he was told that I was on particularly friendly terms with Rose, he said that he, too, had an overwrought mind, an accusation that anyone who knows Rose will find ridiculously unreasonable. He begged Karsten in the name of God not to let himself be infected by these neologists, but he did not know that

42. A street in Copenhagen with a fish market where the fishwives were known for their sharp tongues and salty language.

I converted Karsten long ago, and that all the chemists who have occupied themselves with the matter and really tried to explain the recently discovered phenomena can sense the problems even if it may be too soon for them to change their theoretical understanding. – I spent the rest of the day in Hermbstädt's Laboratory and also studied at home. P. S. Today, April 12th, it is exactly one month since I received a letter from …[43]
Your
Christian.

On the 28th I visited Selbye, who introduced me to another baron, who was visiting him, as Herr **von** Ørsted. I had not expected that of Selbye. By the way, that sort of thing is quite common here. There are several places here where I am called professor even though I have explicitly said that I am not. This is intended as a compliment, but it seems to me to be really rude considering that it is a way of telling people that they are not of sufficient distinction, and one wished that they had finer titles etc. Today I also visited a watchmaker Möllinger, who had asked me to come so that he could show me a very ingenious musical clock, which he had completed recently. It played several instruments at once and thus gave a kind of concert. I find such ingenious pieces interesting enough, but I can only regret that so much time, art and effort are wasted in creating something so constrained and artificial as mechanical music. For a long time Schulz had promised to show me his collection of minerals. I spent another morning hour to this end. What he owns is of no great importance. In the afternoon I went with Dr. Senpf to the deer park, where I also saw a garden at Bellevue Palace, which I had not known was open to the public. The garden is quite insignificant although it must have cost a great deal, as small mounds here and there have been created where nature has given none to a landscape as flat as a pancake. At the moment there is a man here who exhibits a great many wax figures, including one of Kant. This philosopher is said to be so well rendered that Fichte and others who have seen

43. Here a strip has been torn from the bottom of the page. From context, it is likely that the name "Sophie" has been removed.

him maintain that they have never seen a more striking resemblance between the original and the copy. I have never seen the organs of perspicacity, according to **Gall**, so well-defined as in him, both here and in an excellent bust I have seen at Hermbstädt's. This occasioned me to have an interesting discussion with Fichte regarding the genius for philosophy and the mental powers which had really created Kant's philosophy. He observed quite correctly that a philosopher who can successfully create and complete a system must possess all mental powers in an appropriate balance with none developed at the expense of the others. An observation that I have previously made regarding Gall's system in general. He admitted that Kant's theory is really a product of perspicacity, but he claimed, undoubtedly correctly, that this was the cause of the imperfections which Kant's system still has. Fichte, who is otherwise no friend of Gall's system, told me that Gall, undoubtedly after seeing a portrait, had declared that he must possess a good sense of place, which he had to admit was the case. I now wanted to end my day by visiting Weiss, but he suggested that we should visit Möller together, so we went there at 9½; for Möller is a great lover of late nights. When we got there, he immediately said, "How wonderful! We have the whole evening ahead of us." We started to argue about several philosophical ideas with which Möller believed he could refute Fichte. Weiss soon fell asleep, and Möller and I argued until 2½.

The 29th studied. Visited Hermes. A visit from Sitz.

The 30th studied. Hermbstädt's laboratory.

The 31st studied.

April

The 1st excerpted.

The 2nd. In Hermbstädt's laboratory.

The 3rd studied.

The 4th. Hermbstädt's laboratory. Visited Darbes.

On the 5th I visited Grapengiesser and was in Hermbstädt's laboratory in order to construct a pair of galvanic batteries for him for his lectures. The old experienced chemists here are reluctant to use this device. Klaproth does not know either how to use it with the same confidence and precision as his chemical tools.

The 6th studied and again visited Hermes.

The 7th. In Hermbstädt's laboratory and with Kohlraush, who now lives in Charité and, among other things, supervises the insane. He took me around and showed me where they bathe. An old woman, who had recently had a paroxysm from an insanity cured some years ago, was bathing, but that horrible naked figure made such an impression on me that I do not dare awaken it again by continuing to describe the scene.

On the 8th I visited Finch, a relation of Niemeyer. He is in charge of the Halle Bookshop. Later I was at Bendavid's, where I found the well-known Merkel, whom I had not seen before. We began to speak about Denmark, where he told me he had been, and spoke about Danish poets. He confounded Thomas and Malthe Brun with one another and made many such mistakes, which was not to be expected of a man who has written so much on Danish literature in German journals. I asked him if he understood Danish, to which he answered yes, but when I recited a Danish verse by T. Brun, he became embarrassed and admitted that he did not understand it. Had I known that this was Merkel, I would not have let him off so easily; for I would have wanted to examine him more closely. In the evening I met him again in the Philomathic Society, which held its quarterly meeting, to which a number of guests are invited, and the meeting ends with a dinner. I was with Hermbstädt. After the company had almost dispersed, some 10 or 12 remained to drink punch. Among these were Wrede, the mathematician Fischer, Assessor Roesch and others. I also took part in this jolly gathering that lasted until 3 o'clock.

On the 9th and 10th I excerpted. In the evening at the playhouse, where 2 plays, *Das Räuschgen*[44] and *Hercules*[45] were performed. In the first a foreign actor named Meyer showed himself in an unfavourable light. And in the last, Iffland played Hercules better than one might have expected given his voice and appearance.

Your
Christian

44. A comedy in four acts (1786) by C. F. Bretzner (1748-1807).

45. *Herkules Tód* (1802), a melodrama in one act after Sophocles by Johann Friedrich Reichhardt.

On the 11th I visited Grapengiesser and Huth, Professor from Frankfurth an der Oder. This mathematician and physicist is now going to Dorpat[46], to the new university which is to be established there. I was delighted to speak with him about many physical topics but was soon interrupted by Dr. Pelisson, who had arrived, whereupon the conversation turned to other matters. At noon I attended Schlegel's lecture in order to accompany Rodde, a young man from Lübeck who is studying in Halle, and whom Gjerlev had recommended to me. The well-known Merkel was also there, which was all the more remarkable because he is a declared enemy of Schlegel, who had written a very bitter epigram about him, or rather about his writings, some years ago. He also made it quite clear why he had come; the hour was scarcely over before he left although Schlegel had not yet finished but continued to lecture for another ¾ hour. I have also discovered that this wretch tries to keep himself informed about what Fichte has said in his lectures in order to repeat it later at parties, with the most ridiculous distortions.

The 12th. In Hermbstädt's laboratory.

The 13th. As Grapengiesser owns a good galvanic apparatus, I have availed myself of his permission to use it when I want to and used it today to perform galvanic experiments there. In the evening I went to the Society of Naturalists at Hermbstädt's.

The 14th. Galvanising at Grapengiesser's. Today I also met a Swede by the name of Suel. Few people have made such an impression on me as he during our first conversation. I have never met anyone so open and unpretentious. I must soon be separated from him, but I have hope of seeing him more often when I return home; for he intends to settle in Malmö, which is only 4 miles from Copenhagen, where he has a married sister.

The 15th. Galvanised at Grapengiesser's. In the Philomathic Society. The lecture was of no importance. Later I spoke with Bourguet, who has recently announced lectures on galvanism, and turned the conversation precisely on to this topic; but his intellectual poverty on this subject is extreme. He undoubtedly intends to apply himself to this when he sees whether he gets a sufficient audience.

46. Tartu, the second largest city in Estonia.

The 16th. I galvanised at Grapengiesser's. In the evening to tea at Herz's, where Schleiermacher, the Counts Dona and a legation secretary Brinchmann were also present. I walked home with Schleiermacher, who told me that he was working on a series of treatises on the architectonic of the various sciences and, among other things, intends to show how much mathematics is lacking in this regard.

To Professor Manthey:

Berlin, April 16th 1802

I am now in a way clearer about my journey than I was before. The mineralogical friend who wanted to persuade me to go on a walking tour has now obtained a position and will thus not be able to travel, consequently, nothing will come of it. I have now made arrangements so that I can leave here in May, at least before the 20th. My friend Weiss will travel with me, and we shall take lodgings together in Freyberg, which is another saving. It will probably be an advantage to me that he has very good connections in Freyberg as he is a native Saxon and has family in these parts.

Darbes has promised me excellent connections in Freyb. if I want to become a freemason there. With this circumstance most of my problems, including the eco[nomic] ones, are largely eliminated. However, I await your answer to my previous letter about these matters.

As far as the rest of my journey is concerned, I cannot quite make up my mind. I at least believe it decided, and if I do not remember incorrectly, it is your advice that it would be best if I could be in Paris for the coming autumn. As I shall now undoubtedly spend a few months in Freyberg, there will be only 2 or at most 3 months of the summer at my disposal. Rosenstiel eagerly advises me to visit Silesia, where he assures me that there is much to see concerning the mining industry. I quite believe that there they have everything that is not found in Freyberg since they have iron, lead, etc. And thus, this summer, I would be able to obtain such a good encyclopædic survey of mining that I shall scarcely require more as a mere chemist. But is it not too much time to spend on this alone? I shall leave it to you. When, in the future, I occupy myself with the education of

young chemists for my country, it will certainly be useful and also to my credit that I can properly prepare them to become metallurgists, of which our Norwegian mines must be in great need. – Rosenstiel has told me much about the improvements in Silesia which are apparently worth seeing, and for which he can provide me with instructions and admission.

As much as I would like to see Vienna, I fear that the scientific benefit would not be adequate in relation to the time spent.

Another possibility is still open, that is, to visit the beautiful Switzerland before I went to France. – On the way to Strassburg I would also find a few, though not very many, places where I could stay.

These are my ideas. I await your advice, which will be timely enough if it reaches me in Freyberg.

I do not remember whether I thanked you in my last letter for your efforts in getting me the royal gratuity. I owe you this all the more as I would surely not have succeeded without you. I have so many proofs of your friendship that it is easy to forget to thank you for half of them.
With gratitude and friendship
Ørsted

Did you know that the mineral dealer Nepperschmidt has become Prussian Commissioner of Mines? He is once again in Berlin and travels home via Hamburg in a few days.

[Added in the margin:] Please remember that I shall need money before I leave Berlin. If the exchange rate is very bad and there should be hope that it will soon improve, I believe that Hermbstädt would give me money that could be repaid as soon as the rates improved.

Continuation of the travel journal:

The 17th. Worked at home.
The 18th. Today, Easter Sunday, I heard Ancillon, who really speaks well, for which he is much praised here, but whether it is because I

have difficulty with the word of God in French, which has such an elegant form, or whether Ancillon himself gave cause, it rather struck me that I was watching a man paying Our Lord a great many French compliments rather than finding something touching or beautiful in it as I have often found in Marezoll's sermons, and yet he preached on one of the richest texts in the entire Bible: "Blessed are the pure of heart, for they shall see God." – After the sermon I went to Darbes and remained there for dinner so that I had the opportunity to speak with him for five or six hours about several topics of mutual interest. Studied for the remainder of the day.

The 19th. Professor Gilbert from Halle has now come to Berlin on a visit and is staying with Hermbstädt. I visited him and found him and H. occupied with preparations for experiments with light in a darkened room, for gentlemen and ladies. I stayed and was present during this lecture. Some of the experiments and some of the explanations could have been better. In the afternoon I went with Weiss and Remy, a young merchant who has applied himself to mineralogy, to Charlottenburg, where we also saw the garden which belongs to the palace. It is quite pretty but insignificant with regard to its disposition.

The 20th performed optical experiments with Weiss.

The 21st. At Rose's, in Hermbstädt's laboratory, at the porcelain factory.

The 22nd studied. In the Philomathic Society, where Karsten read a paper on Haüy's crystallography.

The 23rd. Hermbstädt's laboratory.

The 24th. I saw Herbst's collection of crayfish, which is known to be one of the most beautiful. I saw it in the company of a Dr. Walther and his wife, who are on a journey and happened to be here. I also had the opportunity there to see some copperplates of Swiss regions which were as beautifully crafted as their subjects were enchanting. My greatest wish was that I could take you there with me. H. also has a large collection of butterflies and other insects which he does not, like Fabricius, arrange according to mouth structure but according to bodily appearance. He is definitely no friend of Fabricius and was rather annoyed that this naturalist had never cited him. Whether this is due to F.'s envy, as H. believes, or

whether it is rather because he cannot make use of his writings remains an open question.

The 25th visited Suel, studied, went to the playhouse. I saw there *die franz[ö]sische Kleinstädter*[47] and *der Kleine Matros*[48]. In the first play Iffland plays the part of Riflard admirably.

The 26th visited Erman. He is very unpredictable. Today he was in his bad humour and also seemed to be very ill disposed to all conversation. Today Meyer lectured on Gall's system for 3 straight hours. I attended his lecture and heard something, though not much, that was new to me. M. is a disciple of Gall and has himself considered this subject so that he was able to point out several errors in Gall. He illustrated his lecture with skulls of several animals and with plaster casts of Friedrich the Second[49] and the actor Fleck. His delivery was good, and he knew how to make the subject interesting.
Your
Christian

To Professor Manthey:

Berlin, April 30th 1802

In my last letter I informed you of my intention to leave Berlin in the middle of May. The date has now finally been set to the 13th or the 14th at the latest. I shall travel with Weiss and other acquaintances to Leipzig via Potsdam and Dessau. I much prefer this route as I did not see Woerlitz and Potsdam on my way here because the season was

47. The French play *La petite ville* (1802) by Louis Benoît Picard (1769-1828) was translated by August Friedrich v. Kotzebue, who was inspired by this to write *Die deutschen Kleinstädter* (1803).

48. *Le petit matelot ou Le mariage impromptu* (1796), French operetta by Pierre Gaveaux (1761-1825) with a libretto by Charles Antoine Guillaume Pigault-LeBrun (1753-1835); translated by Karl Alexander Herklots.

49. Added in the margin: He of blessed memory possessed the organs of cunning and larceny in a high degree. Privy Councillor Rosenstiel, who was also present, commented that one should refer to it as the organ for making acquisitions. On a head that had been taken from the wheel, M. showed us the organ of larceny but not the organ of cunning, which was missing, and he believed this to be the reason why the fellow had come to such a bad end.

unfavourable, and besides I wanted to continue travelling with the ordinary mail coach for economic reasons. Now I shall be in good company and in a favourable season. I shall arrive in Leipzig before the fair is over and probably meet several scholars whom I would not otherwise see and take part in the spectacle theatre that this leading fair in Germany provides. I shall remain in Leipzig for at least 8 days for Weiss' sake and accompany him to Dresden and Freyberg.

If any letter should be sent to me immediately after the receipt of this one, it would undoubtedly still reach me in Berlin, where I have made arrangements so that letters which arrive too late can be sent on to me. Subsequent letters can go to Leipzig, where I can be reached at Pastor Weiss', at Ritterstrasse No. 685. I may have occasion to write to Copenhagen again before leaving.

That I do not send you more scientific news is simply because there is none. And I am sure to know all that is going on here since I am such a frequent visitor in the philomathic and natural science societies. Do you have any information about the letters in question? Klaproth has repeatedly assured me that he has not received your letter. It may be worth learning the cause of this misappropriation. I hope that you have received one scientific letter and one other from me, both of 16th March[50].

Have you sent me any letter after that of February 22nd? At least, I have not received any since then.

I do not remember whether I have informed you that Karsten has taken on the task of a German edition of Häuy's *Mineralogy*, that Weiss and the younger Karsten will translate, and that the mining councillor himself will write a commentary.

You will be able to see from the enclosed notice, which I obtained at a grocer's shop, just how many sciences Scheerer thinks he can lecture on for 4 hours a week from New Year until May. The lectures did not take place.

Tomorrow I shall go on a walking tour to the limestone quarry in Rüdersdorf with some friends. –More later.
With respect and devotion,
Ørsted.

50. These letters do not exist.

Continuation of the travel journal:

May

The 9th. Today a special review was held, and I had been assured that no visitor should miss it. It is certain that half of Berlin crowds in to see it, but for my part I can find no particular amusement in seeing a couple of thousand men in formation without even parading. After the review I had to perform galvanic experiments for two doctors, Warburg and Kauffmann. Suell was also present. I had believed that it was only among our young Danish doctors that one could find so many ignorant of chemistry and physics, but I have had the opportunity to see in these two and many others here in Germany that this is quite common, and when someone among them has some rudimentary knowledge from a lecture, then he manages with that without following the progress of the science. Today I also saw the collection of the Society of Naturalists, where Siegfri[e]d took Weiss, Suell, Remy, me and others. He grumbled all the time, both about those absent as well as those present, something I have often noticed with him. He was particularly rude to Weiss, who had a different opinion from his regarding a fossil, saying that he, like all the other Wernerians, had no knowledge of fossils.

On the 10th I, with my usual companions, saw a factory where they produced a great many carpets with interwoven flowers and the like. Its products struck me as cheap in relation to their quality. A machine to twist yarn captured my attention most. With the simplest and easiest mechanism, this machine twisted yarn from a couple of hundred spindles at once. I have therefore written a very careful description of it. I was at the porcelain factory in the afternoon. Later I visited Fichte and Rose to take my leave of them.

The 11th. Today I was really not able to accomplish anything but leave-taking, which takes a long time in the extensive city of Berlin, where people live so far from one another. Today I managed Klaproth, Ermann, Aronson, Herz, Grapengiesser, and Gnieser and also paid a visit to Baudissin and Selby.

The 12th. Visited Darbes, Karsten, Mendel. Dinner by invitation at Baudissin's, where I quite unexpectedly found Lorenzen. Baudis-

sin has always shown me much courtesy, but he now seems to be doubly taken with me since he spoke with Hermbstädt about me at a party, and the latter praised me greatly and said that if B. could accomplish anything, he should try to obtain even greater support for me from the government although I already had enough to get by because, in my hands, it would be of great benefit to my native country. – After dinner Lorenzen took Selby and me to Classen and his family, with whom he is travelling. Classen is a very jovial man in spite of his illness; his wife sensible, good-natured and solicitous for her husband; the daughter quite beautiful and apparently a good girl. Thus I found myself suddenly as if transported to Denmark and was quite pleased that I had attended to my affairs in Berlin so that I would have time to enjoy their company again tomorrow.

The 13th. Farewells with Darbes, Bendavid and others. Dinner at Classen's with Selby. I spent this last evening in Berlin with Weiss and Karsten.

The 14th. Today I left Berlin with Suell, Remy, Kohlrausch and a certain Dr. Hübbe. We had all got seats in the day coach, and there were no others. This carriage travels each day to Potsdam and most days twice. It costs only 4 marks to take it, and this is really the most comfortable and fastest journey which I have made so far with any mail coach in Germany. We reached Potsdam at noon in order to see Sanssouci and Neupalais. The former still bears the indelible memory of the genius of Friedrich the Second. Nothing has been changed in the rooms he lived in. A scrupulousness which has been carried so far that the books which he had used shortly before his death still lie on the table, the chair-covers are still as they were, torn to shreds by his favourite dogs; in short, everything is in the same spot as before. The rooms in which Friedrich usually resided are of the most exquisite taste and have the most beautiful views. Of everything beautiful that I have seen of this kind, there is no place where I would rather live than there. It is remarkable that from his writing-desk he had a view of an avenue where a statue of Justice immediately catches the eye. As a politician, however, the King did not always have the opportunity to worship that goddess. This palace also contains a great many beautiful paintings. The Dutch mas-

ters, van der Werft in particular, were his favourites as he admitted that he did not possess sufficient insight to understand the great Italian masterpieces, which, however, he did not fail to acquire. In the beginning the works of the French painters had enjoyed his greatest appreciation. I admit that I do not quite understand how anything more than a sound eye is required to prefer the Italian school to the others, whereas I certainly do not deny that study must increase appreciation of them. The paintings, however, are for the most part gathered in one place, in a room where we only had an opportunity to see them in the morning of the 15th. Neupalais, which is quite close to Sanssouci, is also most impressive and contains many beautiful statues; in particular, one finds nine very beautiful ones, which were unearthed at Herculanum, in the so-called Marble Temple. They represent Achilles, who is raised among women and is discovered by the clever Ulysses, who tries the courage and bellicosity of all present. Although there are a great many beautiful antique heads in the same place, these are less noticed due to this beautiful circular group of isolated statues which most appropriately fills the rotunda of the temple.

In Neugarten, which we also saw on the 15th, there is a palace where Friedrich Wilhelm the Second spent a great deal of time. It is decorated with many treasures but not with Friedr. the Second's taste. Some extraordinarily beautiful landscapes by Hackert were the most remarkable for me. The very finest among them depicted Rome and its environs at sunset, in which the artist had created masterpieces of conception and detail.

I am now in Dresden and hope within a week to write to you from Freyberg, to which you can also send letters to me which I will collect at the post office.

Your

Christian.

On the 16th Suell and I left the rest of the party and travelled by mail coach to Dessau. Classen's family departed at the same time in their own coach so that we accompanied them almost all the way. We were seated in an extra coach and were not under cover so that we suffered the discomfort of being exposed to the rain, hail and

wind, which the heavens so richly heaped on us. When we came to Treuenbritzen towards evening, we found it so unpleasant to travel that we, like the Classens, decided to spend the night there. We spent the evening with them and continued the following day in a hired coach, for which Suell and I had found a fellow traveller, a student from Halle. We suspected that he might be a servant or the like and not a student. Therefore, I initiated a conversation with him and discovered that he really was a law student, but that his legal knowledge was far from extensive. In the evening we came to Dessau along with the Classens.

On the 18th we saw several remarkable things, among which 4 different mills all driven by the river, Georgengarten[51] and the playhouse were interesting, each of its own kind. A cemetery outside the town, which was also supposed to be of interest, I found to be insignificant, and the stables did not interest me. For the sake of the old Classen, who is an enthusiast for the hunt, we also saw the hounds which are used. In the evening Suell and I walked to Wörlitz. It was a particularly pleasant walk of about 1 ½ miles. The road is excellent and runs along avenues and partly through woods and gardens with the most pleasing changes. One could almost be tempted to believe that one was wandering through a large English garden; for there is no lack of structures where art has come to the generous aid of nature. There is, for example, a house built of an iron-rich stone which is almost like slag, and actually intended for those who guard the dikes in winter, when there is reason to fear that the Elbe will grow too wide. This house looks exactly like a garden-house, and in W[ö]rlitz one finds many structures of the same material. In the evening we reached W[ö]rlitz in good time, and we dined at the table d'hote at *der Eichkranz*, with several foreigners, whom I can expect to meet again on my further journey.

The 19th. We were up in the morning before 5 o'clock and strolled in the garden, where so many beautiful objects demanded our attention that we could not possibly find the time to inspect them all adequately. I find particularly beautiful a Temple of Venus,

51. Georgengarten in Dessau, established ca. 1780 by Prince Johann Georg von Anhalt-Dessau (1748-1811).

which stands on a small elevation and consists of a dome supported by columns so that every side offers a view of the Medicean Venus who stands at its centre. It is really only a simple statue of painted wood, but it is so well done that one can hardly view it from a distance without feeling the greatest interest. Under this temple are grottoes and subterranean passages into which light falls through yellow glass, giving the grotto a dimness and a yellow glow, which, together with the fantastic figures painted there, give a magical touch to everything. Nearby they have built a cliff which also has subterranean passages. Inside there are rooms in which there is a Venus emerging from the bath, and when you open the door, she turns around, a large toy! Copies of the works of the old Greek masters are scattered throughout the garden. Although these copies are only mediocre, they still look splendid from a certain distance with their noble poses, beautifully arranged drapings, and often appropriate poetic attributes. The entire garden is intersected by canals, over which there are bridges of every kind, so that it would not be easy to name a style that cannot be found here. One style, which I have not seen before, was a kind of hanging bridge that shook in every direction when you walked on it as though it were dilapidated. This was accomplished by means of iron chains hung loosely across the canal, and the boards of which the bridge was made were not connected to one another, but each was connected to the chains with cramps. There were also chains to hold on to instead of railings. In addition to the bridges, dinghies or ferries, as they are called here, serve to get across. These are fastened with a rope to both sides of the canals so that they can be pulled to either side by means of a winch. It is not necessary to pay to cross, but people can help themselves. At about 9 o'clock we returned to the tavern, where the Classens had just arrived. We now took a gondola and had ourselves rowed about in order to enjoy the many beautiful views which revealed themselves. The primary objects of attention are the Gothic House, which contains princely chambers, the Jewish synagogue, which the Prince has had built with good taste, and, near the garden, *der Stein*, from which there is a wonderful view. Even more remarkable is *Das Tempel der Nacht*, which is illuminated only from above by coloured windows in the shape of stars and of the same

apparent size. Above this is a mountain of volcanic form, which is artificially made to spit fire during illuminations. One can ascend it and enjoy a quite beautiful view from there. Sailing on, one encounters a building called the Pantheon, which contains plaster images of several Egyptian gods and seems to be unfinished. I would need several more pages if I were to describe all the interesting things that I found here, and you, who have not seen it would not be greatly amused. I will merely tell you about one more feature, which may partly be my imagination, but it seems to me that the animals and birds here are less afraid of people than elsewhere. I will not talk about the many swans in the canals of the garden that are so tame that they take bread from the hands of the visitors who sail there, but one can often pass quite close by a bird without disturbing it. You can see that I am almost turning this place, or the entire country if you will, into a paradise, but it is merely with industry that it has become what it is; Nature would surely not have made it much better than Brandenburg.

The 20th travelled to Leipzig, where I found Silfverstolpe and Uggla again.

May

The 21st. In the morning, immediately before going out, I received a visit from Steffens, who had encountered Lorenzen in the street and learned of my stay here from him. He is going home soon and may already be in Copenhagen before you receive this letter. We spoke to each other like old friends although we met only a couple of times, 3 or 4 years ago, in Copenhagen. Steffens took me to see F. Schlegel, who happened to be in Leipzig these days. Schlegel had already ordered a carriage for Steffens, who had fixed this morning for his departure, so that I found Steffens only to lose him again the next moment. Today I also became acquainted with Heiberg and saw him or at least spoke to him for the first time. He had a letter to me from Gjerlev. I also met Reinhard, young Brun's private tutor, in the street and walked with him for an hour. However, I did not keep him very long either as he was to leave early the next morning. I also met Brummer today. Finally, Schlegel introduced me to the well-known Spadzier, who publishes *Zeitung für die elegante Welt*. He asked me for a

contribution to his journal if I encountered something remarkable on my journey. One does not easily find so many new and old acquaintances in one day except in Leipzig during the fair. And yet, I still have not told you everything. I also met one of my old acquaintances in a Dr. Meyer, who stayed with Ritter in Oberweimar. I was to eat with him, Schlegel and Madame Veit at a tavern, where everything was quite magnificent. The meal had been ordered by someone else, who did not come and did not inform us. We ran around for some time in order to find the place, but in the end we had to give up and ate at the *place de repos* in a garden, which was quite good, and we left it to the uninformative gentleman to eat and pay for the 6 portions he had ordered. In the evening Schlegel and I ate with Rossi, an Italian.

On the 22nd, I got up at 3 o'clock in the morning in order to take my leave of the Classens, whom I had not been able to see in the evening. When they had left, I woke up Suell and got him to walk with me around the town, where they have an exceedingly beautiful promenade. The pure morning air and the pleasant walk occasioned the most intimate conversation, and we came home in the most agreeable mood at 6 o'clock, an hour at which we otherwise would hardly have been up. Taking leave of Schlegel and visiting Heyberg, Brummer, and Weiss took up most of the rest of the day. With Weiss, I went to see Reinholdt, in whom I found the most skilled, after Ritter, of all those whom I have seen occupy themselves with galvanism. He showed me very courteous friendship. In the afternoon I was to meet Weiss and his brothers at Kolitz, a village near Leipzig. It is reached by the most beautiful paths, which wind among trees and bushes. This stretch is called *Rosenthal*, but I do not know why as I saw neither roses nor rose bushes there. In the evening I was at Beyganges Museum[52], a reading room, where one finds all journals and other new publications with unusual completeness. The town's residents have access by subscription; visitors, on the other hand, are admitted free.

On the 23rd I was invited to Reinholdt's for coffee, and in the evening he took me to a kind of club, in a garden outside the town,

52. Subscription library in Leipzig (1795-1820), founded by the bookseller Johann Gottlob Beygang (1755-1823).

which is called *der Helm*. There I met a Dr. Apell, a Schellingite but modest and interesting.

The 24th visited Count Schack and Bekker, my countrymen. I knew Bekker from before; he had a free place at Ehler's College. They are of interest only because they are my countrymen, and even in that capacity there is not much to recommend them. In the afternoon, galvanic experiments at Reinholdt's. He is an exceptionally precise experimenter.

The 25th with Ludwig – with Schak and Bekker – with Professor Eschenbach.

The 26th. Dinner at Spadzier's, with Cramer from Paris, formerly of Kiel, and A. W. Schlegel. Today I visited Dr. Martens, who has shown much talent as a medical polygraph[53]. I asked him about many things, among others about how he performs his galvanic experiments on the sick, but he seemed to me more like a schoolboy who was doing badly in an examination than like a man who had thought and worked independently. Later at Reinholdt's.

On the 27th, I left for Dresden in the company of A. W. Schlegel and Suell. S. had borrowed a carriage from Fichte, for which we hired horses at the coaching inn. This evening we got only as far as Meissen, where we spent the night. Schlegel and Suell were both in extremely low spirits all day so that I did not enjoy myself very much. Here we tasted the local Saxon wine, of which that from Meissen is very famous. I found it really good and with a purer taste than most of what is sold as foreign wine.

The 28th. At 5 o'clock in the morning we left for Dresden and arrived there at 8 o'clock. The country through which one travels is exceptionally beautiful. The road runs between vineyards and the bank of the river and presents the most agreeable variety to the traveller's eye since he sees as many shimmering images of things in the river as he sees solid mountains and the like above. He sees Dresden itself reflected in the river long before he arrives there. Already today we (Suell and I) saw the beautiful collection of plaster casts of antiquities from Rome, Florence, Naples, etc. I thought of

53. "Polygraph" in the literal sense of being a prolific writer.

you, my Sophie,[54] and wished that I could at least show you the lovely group, Amor and Psyche, who are united in an embrace so intimate that imagination finds it as difficult to part them as did the artist's hand. Were I to write about all that I found beautiful here, I would not finish in many letters. I shall therefore mention only a few of the things that I found beautiful in order to keep them in my memory although I hope never to forget them. The Medicean Venus, Apollo of Belvedere, a combat between two gladiators, one of the Greek heroes who is bringing back the wounded Patroklus, a head of Juno, colossal and majestic, a great many bas-reliefs from Trajan's Column, and much more is found there. The collection has been arranged by the famous painter Mengs, who in this, too, has shown his great insight and taste.

The picture gallery contains many excellent pieces, in particular by Corregio, by whose hand they here have six pieces, among which *The Night* is the best of the best. Christ is lying in his mother's lap, and from him streams the light which illuminates the infinitely dark night. The people who approach are blinded, frightened, amazed; only the mother is not blinded, nor are the angels hovering above in clouds resplendent with the new light. In order not to begin something which I cannot finish, I want to mention only a few of the other masterpieces, such as a Madonna by Raphael, a Christ, to whom the Pharisee shows the tribute money, by Titian, a Saint Catherine playing the organ by Carlo Dolce, *The Dream* by Dosso Dossi, *The Adoration of the Magi* by Dürer, etc. – At dinner at *The Angel*, the tavern where we are staying, I made the acquaintance of a Swedish traveller named Lundström, whose primary interest is mining; two Drs. Sauer and Stransky and a Count Lippe.

On the 29th, we saw the antiquities, an immensely rich collection of beautiful statues and other antique sculpture. Here one sees the transition from one artistic era to the next, and one even finds pre-Homeric works, that is, more than 3000 years old. Of particular merit among these is an altar, whose sides depict in bas-relief how the tripod was stolen from Apollo, how it was recovered, reconsecrated, etc. The Greek faces are here combined with rigid Egyptian attitudes and

54. The word "Sophie" has been deleted and replaced by "brother".

with all the many straight lines later condemned by Greek taste. Another extraordinary piece is a Minerva, which approaches this style but is somewhat later. Some statues which were excavated at Herculanum are also remarkable for their magnificent poses and their excellent drapings, where you clearly see how one raiment covers another or is stretched over the body, everything with a realism that I have rarely seen equalled. I was also charmed by a young Bacchus standing in a vat with grapes and holding as many as he can in his arms and pressing them to his bosom, whether to kiss them or to carry them is unclear. In the same building which houses the antiquities there is also a collection of porcelain in which I did not find anything of note except for the excellent works of the man who first discovered porcelain in Europe, Boetker. In much of this, the forms and the workmanship are really as beautiful as I have seen only rarely in later artists. On this occasion we also saw some excellent tapestries, woven after Raphael's paintings. – The building in which all this is found is called the Japanese Palace. In the afternoon I saw the plaster casts for the second time; for here you have the advantage that once you have paid to see them, you can see them as often as you like for free.

The 30th was a Sunday. None of the sights were open to visitors, but I had the opportunity to listen to the beautiful sacred music in the Catholic church, which the Prince and the few Catholic inhabitants frequent. The Catholic service here is performed with all possible magnificence, with the exception that the procession is somewhat limited as the people here, who hate the Catholic religion as intensely as the Prince loves it, do not permit any procession to leave the church. The music here is arranged at such great expense that some castratos and many other singers are retained to perform vocal music with the organ. – In the evening I saw the operetta *Der Wasserträger*[55]. No comedies are performed here in summer, but the company which performs them in winter goes to Leipzig in summer, and another company then presents operettas outside Dresden, in *Lehmanschen Bad*. The actor who seems to have the most talent is Mr. Wagner, who, however, has only refinement enough to play comic and similar roles of the lower sphere.

55. *The Water-Carrier* (1800), a lyric comic opera by Luigi Cherubini (1760-1842).

On the 31st I visited Dr. Titius, to whom I had a letter of introduction from Count Baudessin in Berlin. He was quite courteous and offered me much advice, all of which involved him helping me to spend money, which I took the liberty of not doing. Among other things, he wanted me to see a collection of mathematical instruments, which is not important, but for which I would have had to pay a ducat to one of his friends who is in charge of it. He suggested to me that I would thereby have the advantage of becoming acquainted with a man who performed many galvanic experiments, of which he might have the goodness to show me some. As Reinholdt in Leipzig had told me that the friend in question, Mining Councillor Seiffer was a great sinner in physics, I asked Titius if S. had performed experiments which were otherwise not familiar, and when he could not answer this with a "yes", I told him that I had myself performed one or two new experiments, and that I was acquainted with the greatest galvanist in Germany and had seen his principal experiments. This had such a good effect that he assured me that it would certainly be a great pleasure for S. to meet me, and that I could certainly tell him things that he did not yet know.

Today, in the company of Stransky, Sauer, Lippe, Suell and others, I saw a collection of precious objects, regal insignia and the like, which is known here under the name of **das Grüne Gerwölbe**[56]. The electoral princes, particularly those who were also Polish Kings, had wasted their money in order to procure great quantities of gemstones and other precious objects, of which the eye soon tires although one or two things are of interest, but it is mostly artfulness, such as entire figures composed of pearls and framed in gold, entire groups of silver, gold or gemstones and so on.

For the entertainment of the Court and of himself, the Prince has an Italian opera company, which is without doubt one of the best in existence. Today I saw a dress rehearsal of a play which is to be performed tomorrow at Pillnitz, the Prince's summer residence. Such superb singing, combined with such good acting and such a wonderful orchestra, really makes a magnificent impression. In winter,

56. The Green Vault, a museum in Dresden Castle that contains a large collection of treasures, including the crown jewels of the Saxon kings of Poland.

these operas are performed twice a week in the town theatre, where an admission fee is charged.
Your
Christian

Your next letter should still be addressed to Freyberg[57].

June
The 1st. In the company of Sauer, Stransky, Suell, Count Lippe and others I saw the natural history collection. Titius is a great enemy of Werner and spoke quite ill of him mostly because he had not been informative regarding matters of interest to Titius. T. brought regards to me from Seiffert, who wanted me to visit him. In the afternoon I travelled with Suell and Lundbye [Lundström?] to Pillnitz, where the Prince has his summer residence, in order to see an opera that he was having performed for the Court and for the residents of the nearby towns and villages. It is forbidden for Dresden residents and foreigners to go there, but the court pages let us and others enter without difficulty. The reason for this ban is that some foreigners, particularly Englishmen, have not behaved with the quietness and modesty which should be shown particularly when one is admitted to an entertainment that is not public or to be had for money. The opera was Italian, but nevertheless I understood it quite well due to the similarity of that language to Latin and French. The singing was excellent. Most of the roles were well performed, some even superbly. The orchestra was also filled with good musicians, with the result that I have never heard an opera performed better. Such arrangements cost the Prince a significant sum annually since many of the artists receive 1000, even several 1000 Rd. They are hired for a year or more, and when they leave service, they are given travel money. In winter, operas are performed twice weekly in the Dresden Theatre.

57. The following has been added in the margin: At the moment a Lieutenant [the name "Probsthein" has been crossed out] is staying in Freyberg. As [name crossed out] knows something about his family, it might be possible to get him some additional information.

On the 2nd I spent most of the day viewing the antiquities and the plaster casts again, something which, repeated hundreds of times, must still give pleasure and knowledge every time. In the evening I saw the opera *Die Zauberflöte* at Bad Leman. To hear German sung badly the day after one has heard Italian sung well is one of the hardest trials which anyone's musical patience can experience: Nevertheless, I bore it to the end because I had not heard this excellent work before, and because the music was so well played that one would have been content if only they had not sung to it.

On the 3rd I visited Tiek, with whom I had a quite interesting conversation about some of the latest philosophical ideas, particularly about Schelling, with whom T. was far from satisfied. Today I also visited Seiffert, an engineer who is also regarded as a physicist, but that does not mean much. He told me that he could perform some forty galvanic experiments, from which I saw that he performed experiments the way a child learns its lessons. He invited me to the observatory in the evening to try a telescope. I brought Suell with me. He had never observed the heavens with an instrument and therefore found it of great interest. I also take great pleasure in viewing the sky in this manner. It is a special and magnificent impression to feel the eye being moved many thousand miles closer to these mighty planets, to see the mountains of the moon and Saturn's rings and many moons, and thus to look at foreign worlds. The observatory, or rather the collection of mathematical instruments, is a dome on a building which encloses a courtyard, called Zwinger, on 3 sides. The fourth side was also to have been built on, and all together form a palace in the same style as the Catholic church opposite; a building which is in neither Greek nor Gothic style, and which is in no sense consistent with the rules of architecture but still pleases the eye. The entire building around the Zwinger is flat on the top except for some pavilions. Astronomical instruments are often used on this flat roof, which has a beautiful view. Through Seiffert I made the acquaintance of a secretary who possessed such a strong sense of etiquette that many a courtier might learn from him. He took me to an Apothecary Binger, in whom I found a quite well-informed man.

We spoke mostly about the medical anarchy which reigns in Saxony, where there are hardly any regulations to protect the public against incompetent apothecaries and doctors.

On the 4th I and many others saw the armoury, which contains a great many weapons, suits of armour, stuffed horses with saddles etc. displayed in 36 rooms. Precious objects, such as harnesses mounted with gems, guns with rich settings and the like, are here in abundance, but none of it is particularly old. Everything is from the last 2 or 3 centuries. I find it of historical interest merely because it gives an impression of the extraordinary splendour and extravagance that reigned under many of the electoral princes, particularly those who were also kings of Poland. Among other amusements, they also had frequent masked parades, in which the prince and courtiers once posed as the sun, moon and planets, another time as the Turkish court and the like. Some models, or rather groupings, which depict tournaments and knightly games also interested me as I had not seen anything like them before. I also visited a countryman Wolf, a painter, with Heyberg and accompanied him to the opera.

The 5th. Picture gallery – Tiek. Was in Friedrichsstadt, a beautiful suburb I had not seen before.

June

The 6th, Whitsunday. In a Catholic church. There is little to do except go to church and stroll during these days since none of the sights are open, and so few of the people one wants to talk with are at home as Dresdeners often choose to spend these days in the country.

The 7th, Whit Monday, also in a Catholic church. Paid a visit to Privy Councillor Bylow. I had not yet found him at home as he spends the summer at a country estate.

The 8th. There are 3 holy days here, therefore 3 days to waste. Today I was invited to dinner with Privy Councillor Bylow. I have never seen a minister with such school-masterly deportment, and with whom everything was done so simply. His two daughters and an elderly French lady were the entire party. Beside Bylow was an open bottle of red wine which he served first, and later, when it was

empty, another full bottle was produced. Otherwise, everything was as it is at the inn where I eat daily, *im goldnen Engel.*

On the 9th I set out on a little walking tour with Sauer, Stransky and Suell in order to see some of the most interesting parts in the vicinity. In the morning we walked from Dresden to Pillnitz and from there to Stolpen, where there is a basalt mountain, from which beautiful basalt pillars are quarried. On the mountain are the ruins of an old castle, where one of the Polish kings' mistresses was imprisoned because she had shot at the King in jealousy. In the castle yard is an extremely deep well, where it takes a long time to hear the sound of a stone dropped, and if it is of some size, it falls with a loud subterranean rumbling. It had started to rain, we had already walked 4 miles, and it was late, so we lay down to rest here and slept our exhaustion off in very mediocre beds until the following day when our hired guide came to us before 9 o'clock, and we set off again. We had not gone very far before stone steps led us down a mountain into a very deep depression, where we suddenly found ourselves surrounded by numerous cliffs which enclosed a valley not much wider than an ordinary street. It was really more of a gorge than a valley. It was clearly a large rock that had once cracked in a violent natural upheaval. There were three paths where we entered. We went first to the left and then straight ahead, but both paths were soon so overgrown by the many trees that spring up here, sheltered from the wind, that we believed it impossible to go farther, so we followed our guide down the third path. We soon came to a place where nature had played with the strangest forms and displayed grotesque masses, one of which had the shape of a sitting animal, a second that of a lion's head, a third that of a prostrate body. We then came to places where the gorge, now two or three times wider, gave the abundant vegetation more room, and then we again found the valley so narrow that we feared it would close so that we would have to climb the rocks in order to get out. Finally we found a low gate, carved in stone, through which we left that part of the valley for another, which was generally not much wider and, if possible, even more beautiful. This continued for such a long time that we no longer believed that this romantic gorge would end. Finally, however, we came to a place where it was suffi-

ciently wide for a carriage road to go through it; we followed this, and thus came to Otterwalde or Udderwalde, a village outside which there are some ruins. From here we went to Wehlen, where we crossed the Elbe, and then had to climb several mountains in order to reach Königsstein. I have heard so much about this mountain fortress in my childhood that I approached it with high expectations and all my imagination. Little wonder, then, that my expectations were not fulfilled at first glance. I had imagined it as an extremely high rock, and I now saw it first from another very high point, from which it really did not make a favourable impression on the eyes. However, when we again descended into the valley in which it lies, near the Elbe, it seemed both bigger and more threatening. We climbed the mountain, which took about half an hour but is not as much as it seems since the path winds like a snake. When one gets to the rock, one must ask the guard for permission to climb, which is never denied, as there are considerable advantages in showing the curiosities of the place. One ascends along paths which are cut into the rock, and here and there are embrasures for small cannon and flintlocks with which one could still shoot down an enemy who had advanced so far that he could force his way through the gate. When we had finally overcome the discomfort of having climbed so high after having walked several miles, we saw that we had been rewarded by an extremely wide view of the region. The mountains over which we had come, Pfaffenstein and Lilienstein on the other side of the Elbe, the Bohemian mountains, Dresden, Meissen and much more, revealed themselves clearly here. It is said that Königsstein is 1800 feet above sea level, but this is hardly believable since in that case Brocken can only be 1/3 higher. Mining engineers have carved a well in the rock. It is extremely deep. When one pours a pail of water into it, it takes several seconds before one hears it fall. On one of the ropes used to haul up the water there are 4 or 5 candles mounted on arms so that they form a circle whose diameter is about 1 foot. When these have gone as deep as they can, it is scarcely possible to see the distance between them. Among the curiosities here is also a wine barrel as large as a small room in which they keep a bucket of wine. Using a siphon they can draw up enough so that every visitor present can have a glass. This

sour wine, however, is most welcome after the long climb up the mountain. The casemates are extremely solidly built, wholesome, and as comfortably arranged as possible, as are the magazines. The armoury here is not worth seeing. There is a hewn ledge about six inches wide beside a building at the edge of the rock, where an intoxicated court page lay down to sleep off his intoxication. When the Prince heard about it, he had him taken down by a roofer. If he had fallen, he would undoubtedly have been crushed on the spot by his own weight. On another occasion it happened to the same page that his horse jumped from a very high bridge into the Elbe with him. He also escaped from this unharmed and lived to the age of 106. When we had seen the fortress, we took a boat down the Elbe to P[i]rna in the company of a dreadful woman from Dresden, who forced herself upon us. We arrived there early in the evening, and I wanted us to continue to Dresden later in the evening, but none of the others wanted to travel more that day so that I was outvoted. The next day, the 11th, we sailed to Pillnitz, looked around a bit more, and finally reached Dresden about noon. In the afternoon I again visited the picture gallery and had an extremely informative conversation with Tiek there about Corregio and several other Italian masters. He believes that no painter has really understood the ideas that can be expressed with the mere change of colours, especially light and dark, as well as Corregio. Stransky had said about Corregio's *Night* that he failed to find the devotion there that he found in the religious works of the other masters, and that it seemed to him that the artist had played with colours in order to make himself shine; in short, that there was an infinite flirtation with colours in it. T. wanted to refute him. He proceeded to elaborate on the beauties of *Night*, which was now in front of us. He said: It is the struggle between light and darkness. All light comes from Christ; indeed, he seems to be nothing but light. That is why the outlines in it are so weak and, here and there, almost unrecognizable. All this is more definite with Mary, and it is easy to see that she does not shine but borrows her light from the Son; she is transfigured and sits with serene majesty in the rays of light. The people standing around have lived in the dark and are thus the representatives of darkness. Hence, the evident signs of dread, wonder and fear that one finds in the

various faces and poses. "The angels who hover in the air above," about which Stransky had said that they made the movements of tightrope walkers, he said, "are turned to the light and rejoice; hence, the light-hearted movements with which they embrace one another as if to form one body." Besides, the dense darkness which is found where the light does not penetrate and the contrast it makes with the lustre of the light are well done beyond description.

On the 12th I saw the library with Lundström and Suell. It is extremely neatly arranged on shelves, and it really has the most beautiful rooms of all the libraries I have seen and a very beautiful view (it occupies the 2 upper floors of the Japanese Palace), but the ordering of the books is not the best. I found, for example, among the Latin mathematicians Plinius and others who did not contain the least bit of mathematics. I also find it offensive that none of those who wish to use the library as scholars, even those who are known there, can move freely about but must be accompanied by one of the attendants in the library. This either indicates a mistrust which is not found in Göttingen or in other large libraries, or it is in order to force the scholar to pay such a person something, a beggarliness which is horribly apparent almost everywhere I have been in Germany in contrast to what I have heard about Paris, Vienna and some other places. – Drank coffee with Binger in the afternoon and made preparations for my departure.

On the morning of the 13th travelled to Tharandt with Suell, Rodde, Stransky, Sauer. The road from Dresden through the *Plauische Grund* is extremely beautiful. We got off there and walked until we again came to less interesting parts. Tharandt lies in a hollow in the mountains. Each of these surely affords the most beautiful views, but to ascend them all would require a stay of many days, so we chose the highest, from which we had the opportunity to see many beautiful parts and many distant objects right into Bohemia. Things are nicely arranged at the summit so that one can rest comfortably there.[58]

58. Here ends letter No. 30 (June 13th). The next letter is No. 32 and begins on June 24th.

To Professor Manthey:

Freyberg, June 23rd 1802

I now have an outline of my plan for the journey to France and hereby present it to you for your judgement. Since I have now seen so much of northern Germany, I think that it would be useful for me to pass through the southern part, and this journey is planned accordingly.

The places I shall pass through are Chemnitz, Zwickau, Schneberg, Bayreuth, **Bamberg, Erlangen, Nürnberg**, Regensburg, Landshut, whose new university seems to be of importance, **München**, Augsburg, Ulm, Stuttgart, **Tübingen**, Mannheim, Heidelberg, Carlsruhe, Strassburg. This route will cover something more than 100 miles and will take more than 2 months. I have already gathered a number of sights, but I am not quite sure what scholars I shall find, with the exception of a few but excellent people. Therefore I would be most grateful if you could send me some introductions which could be used on this route. I particularly wish to have a letter of recommendation for Nürnberg, where I feel that it must be particularly important to have an acquaintance who can supply me with information about the many sights and, in particular, advise me to avoid wasting time on things which are not worth seeing. The route could be shortened a little if I went directly from Tübingen to Carlsruhe and left out Mannheim and Heidelberg, but I do not know if I should neglect seeing these places.

In your last letter you mentioned that I should spend the winter in the south of France, but would this not take too much of my time? One year of my journey has already passed, Paris will take almost an entire year, Holland will also require some time, and thus 3 whole years would have been spent. This does not exceed the limits of my journey, nor is it against my taste. One certainly lives very comfortably on such a journey, and I have really developed a taste for it; but I should not let my poor Sophie wait so long if it is not necessary. You yourself know how many obligations rest upon me in this regard. Another circumstance which should also be taken into consideration is that I shall surely require some, although not much, more than my travel grant. Even if you were willing to show me your friendship by

advancing this money to me, it would still be difficult for me to repay it upon my return, whereas another plan for my finances would help with these difficulties: If I arranged to come home at the very start of my last half-year, I would already have received the grants for this period, and these could be used to make good the deficiency caused by my journey, and I believe that this would be sufficient. Therefore, I have decided to arrange my journey so that I go from Strassburg directly to Paris. As it seems that the summer months are far too hot in the south of France, I shall leave Paris at the beginning of March in order to spend a couple of months there, then go to Switzerland, return from there to Paris, from where I shall travel to Holland late in Sept. or early Oct., and from there return to my native land at the end of Dec. 1803 or in January 1804. I see no way to avoid the inconvenience of travelling through Holland in winter. I consider it quite good that I shall thus visit Paris twice as one undoubtedly gains by seeing a great city in 2 periods. I beg you to give me your thoughts about all this as well as your additional advice if you think the journey should be planned differently.

Naturally, I must have some more money before leaving Freyberg. Would it not be better for me to have letters of credit for some of the places that I plan to pass through than to receive money orders upon request as I have done until now? It is far too inconvenient if one carries a large sum of money and unfortunately loses it, or if an unexpected expense arises or the like. If you would arrange such letters of credit for me, I would also request one for Freyberg, or Dresden so that, from there, I could obtain a money order for Freyberg. It is possible that the sum I have would be sufficient until Nürrenberg, but that is quite uncertain as I cannot yet foresee all the expenses which I shall have here.

I would be most appreciative if you would answer this letter very soon, as it is quite possible that I could finish Freyberg in another 3 to 4 weeks.

I believe that the enclosed certificates from Karsten and Hermbstädt will be sufficient; but I cannot promise to be able to obtain certificates more frequently while travelling as I am unlikely to attend many more lectures, and, even if I did attend some in Paris, I would not care to demand a certificate of attendance. Instead, at the

end of each year or half-year in the future, I can send a summary of what I have done on my journey as I am doing for the Royal grant. I merely attended Hermbstädt's lectures as a visitor and requested nothing more than certification that I had worked in his laboratory, the rest he has added himself.

Hermbstädt will soon send you his new book on dyeing or may have sent it to you already.

My brother will probably soon bring you a copy of Mendel's translation of my metaphysics of nature. Please let me know if copies should be sent to others so that I can arrange it with appropriate letters. However, I am inclined to think that there is so little to recommend the subject to most people that it is better not to distribute it. I will, however, have my brother give you a copy for Accountant Jørgensen. He can profitably read Mendel's introduction, in which my work is praised to excess. Klaproth, Hermbstädt, Rose, Erman and others send their regards.

Many regards to your wife, your little Ludvig and your brothers.
With respect and friendship,
Ørsted

Continuation of the travel journal:

June
The 24th. On Thursday evenings it is usual for a rather large party of the town's citizens, including ladies, and visitors to assemble. Werner is to be found there almost every time, and it is undoubtedly he who holds the party together. I was also there this evening and found, among others, Lieut. Propsthain, with whom I spoke about his family.

The 25th. Worked at home.

The 26th made an excursion to the country with Weiss.

The 27th visited Werner in order to speak with him about various matters related to my work here. Moreover, worked at home today as well as on the 28th and 29th and made an excursion to collect minerals.

The 30th again visited Werner, who was most willing to give me information and instructions.

To Professor Manthey:

Freyberg, June 30th 1802

I must make various scientific expenditures here and purchase several necessities which will require approximately 100 Rd. If I tell you that I otherwise have the money required for everyday living, you will know best how much I need in all as you know my itinerary. You may already have taken care of my financial matters on the basis of my last letter, and in that event, it has probably been done in such a way that these expenses will not cause financial embarrassment. I am informing you of this only so that you could still make arrangements if you felt it necessary. I would like to write more, but the departure of the mail forces me to be brief and to postpone the additional information I wish to give you about my work until the next time when I have the pleasure of writing to you, which will not be long. The next letter will still reach me in Freyberg.

With respect

Your

Ørsted

Continuation of the travel journal:

July

The 1st. Visited Mining Engineer v. Charpentier in the company of Weiss and Lambert. Charpentier's house is considered to be the best in Freyberg. His daughters are very cultivated, and one of them is very beautiful. Therefore, people visit his daughters rather than him, and I think they are quite right. In summer, Charpentier mostly lives outside town near a mine called Churprinz, which is the most beautiful part of the country surrounding Freiberg. We did some walking with him and his daughter, only one of them was at home, and he tried to show us all the curiosities in the area which seemed to be contrary to Werner's theory. It was most amusing to see how he managed that, for often when he thought that he was showing us something which he said was quite contrary to what Werner had said, it was necessary to close our eyes in order to avoid seeing the opposite. On the way back, we visited Dr. Mitchel, an

Englishman, whom Werner numbers among his ablest students, and Moes, a similarly capable mineralogist, who is staying with him.

The 2nd worked at home.

The 3rd. In order to become acquainted with this area and some of its mineralogical curiosities, I went on a walking tour with Weiss. The day began with pouring rain and gale so that we had already decided to postpone the tour when it began to clear up around noon. We then decided to set out, and success crowned our effort. In a pleasantly cool air we wandered through the Bobritsch valley, thus named after a stream which runs through it, and the beautiful Kolmnitz valley to Kolmnitz. Here we reached the Tharandt forest, which we, according to the information we had received, had to cross to reach Grillenburg. It is quite common for strangers to go astray in this forest, and we almost began to fear something like that when we unexpectedly heard the bell in Grillenburg ring, and we had scarcely taken more than a few steps before we saw the town. We rested here for some moments and heard to our greatest pleasure that Tharandt, which we believed to be 3 miles distant, was only 3 hours (1 ½ miles) away. Thus we reached this pleasant place rather early in the evening and spent the night here. The following day, Steenstrup from Dresden came through here on foot. We hailed him, and the three of us now set out to explore the area together. When we had walked ourselves to exhaustion and wanted to go home for dinner, we were invited by a certain Mr. Breyer, who knew Weiss, and were welcomed there with great courtesy. In the afternoon we wasted a couple of hours watching some poor circus riders, and the rest of the day was again devoted to the mineralogical objects of the area. On the 5th, W. and I walked through the *Plauische Grund* to Dresden. We spent all morning on this road, looking at mineralogical objects, and at noon we returned to Dresden, where we found our friend Möller from Berlin, Suell, Lundström and others. Werner was also there, dining at the table d'hôte. I spent most of the afternoon with Lundström, partly at home and partly walking. I like to converse with him because his geographical knowledge enables him to tell me a great deal that can be useful to me on my journey, and the information I get from him about more recent his-

tory, particularly about the revolution, contributes to my not appearing too uninformed when the conversation turns to such matters at parties.

On the 6th, we had a laborious day. In the morning, not very early, we left Dresden on foot in order to see things which we had not seen in the *Plauische Grund* on our outward journey. The day was hot, and the mountains which had to be climbed contributed much to our exhaustion, but a great many beautiful minerals and, even more, lovely views richly rewarded our sweat. The *Windberg* was the biggest of those we climbed, and it is the highest on this stretch so that it is possible to see it from far away. The ascent is extremely easy, and one reaches the top of the mountain through shady trees. There, among many beautiful things, we found some cornelians, and as our attention was now doubled, we found more and more, even directly on the path where people go up and down. On the side which overlooks the *Plauische Grund*, we had a wide and beautiful view of several villages, mountains, and rich fields, in such beautiful variation that I consider this view among the most beautiful I have seen. At the foot of this mountain, they were boring for pit coal, and I also got to see that on this occasion. Nearby there was also an open-cast coal mine, which we visited. There is also a glassworks in the vicinity but not one of any great importance; they only make bottles there. W. and I each blew a bottle in order to see what it was like. This stretch of the *Plauische Grund*, in whose middle (though closer to Dresden) the village of Potschappel is situated, is everywhere rich in coal mines, and the Prince has had an adit built which leads the water away from them all. This is the most excellent thing I have seen in mining. Everything in it is built of brick so that it could pass for a room in a house, and the entrance is a magnificent portal. From there we walked to Mount Burkard, where we found a laborious ascent and descent but nothing interesting. We arrived at Tharandt in the evening and stayed there also on the 7th, when a smelter from the Harz, by the name of Schäffer, joined us in the evening.

On the 8th, we walked back to Freyberg but by another route than the one by which we had come. Quite close to Tharandt we found a limestone quarry, which was worked through shafts, which we descended. I was also interested in a lime kiln they had there,

which was constructed differently from those I had seen before. From here we came to a small mountain called *Ascherhübel*, which consists of basalt. The people in a nearby village explained to us that it had previously been an active volcano, from which I saw that they are volcanists in geognosy. From Landberg, which is a 3/8 mile from there, we had a view over a long range of mountains all the way into Bohemia, and just below us was a valley with the village of Kesselsdorf and several others, where Friedrich the Second of Prussia fought a great battle. In the valley on the other side of the mountain lies the village of Grundt, where we hired a guide who was to take us to the most interesting places in the area; we knew their names but would not be able to find them easily. For this purpose we hired a cobbler, who had occupied himself with mining without understanding much about it, but who knew everything about the area. He took us around for two or three hours, also in order to show us what interested him, and finally brought us back quite exhausted. We then walked from Grund to Mohorn, where there are interesting porphyry mines, and from there home, which we did not reach until evening.

On the 9th Stenstrup and I saw a machine for drying grain, by means of which it is possible to preserve grain for several years. The device was very simple and good.

The 10th worked at home.

The 11th another excursion. In the morning, in the company of Stenstrup and Schaffer, I drove to Olbernhou, where almost the entire town is filled with factories. However, as we did not want to spend the night there, we went immediately to the *Saigerhütte Grünthal*, where the *Anrichter*, one of the highest officials there, received us amicably and said that his son in Freyberg, whom none of us knew well, had written to him that we were coming. He took us everywhere and accompanied us over the border to Bohemia, where we had to have our passports certified by a collector, who wrote a few meaningless lines in them. We passed through a beautiful valley and arrived in the evening at Delsch, where there is a blast furnace, a sheet iron works etc. The controller, by the name of Balling, the highest official here, received us most hospitably and lodged us in his rather small residence.

On the 12th he took us to see all of the establishments here. On this occasion we made the acquaintance of a Dr. Weise from Olbernhou, who happened to be visiting him today. We intended to leave Delsch in the afternoon, but there was rain and thunder such as I have seldom seen, so we were forced to spend another night there, and the following day we walked to Olbernhou in weather which was only slightly better. Dr. Weise came to us immediately and showed us the factories here. We saw a mirror maker, a gunsmith, and a file-cutter.

On the 14th the weather delayed our departure in the morning. In the afternoon we took a wagon, which was covered with canvas, to Grosshartmannsdorf; the driver was tipsy and malicious. From Grosshartmannsdorf to Freyberg we walked for 3 hours, from 8 to 11 o'clock in the evening, and arrived soaking wet.

The 15th worked at home. In the evening at a party at Mme Graf's.

From the 16th to the 21st worked at home. The weather did not permit excursions, but as I can here avail myself of the manuscripts of Werner's lectures and the like, such days are not wasted.

I spent the 22nd, 23rd, and 24th at the amalgam works and thus became fairly well acquainted with this beautiful establishment, which I had previously seen with Lampadius.

To Professor Manthey:

Jena, August 19th 1802

I feel that I have postponed writing to you for far too long because I wanted to wait until I was able to let you know that I had received the money forwarded to Leipzig and to tell you how my journey has been arranged in detail. Thus, more time has passed than I had wished, for which I hope you will excuse me. I am now with Ritter and do not regret that I have visited him; this is partly because I learn something every moment in his company, and partly because he has promised to send his most important discoveries to me in Paris and give me the task of reporting them to the scholars there, which must be particularly useful to me. He has now completed an extensive treatise on the shock that is given by the galvanic battery

and, with unusual clarity, followed all these phenomena back to their true origin, first discovered by him, in expansion and contraction. When you receive this treatise in a few weeks, you will be pleased to find in it a subject that hardly anyone has considered worthy of investigation, elevated to an object for the most important investigations which shed new light on so many of the mysteries of physiology.

Above all, I must draw your attention to a particularly important experiment with water.

[*A* has a glass (*a*) with 3 parts hydrogen and a glass (*b*) with 0.5 oxygen. *B* has a glass (*c*) with 1.5 hydrogen and a glass (*d*) with 1 part oxygen. There are conductors in the 4 glasses.]

The gold wire in *a* is connected with the negative conductor of the galvanic battery, that in *d* with the positive. The gold wires in *b* and *c* are connected with a metal wire. The relation is now *a*'s hydrogen : *d*'s oxygen = 3:1 = *c*'s hydrogen : *b*'s oxygen; but *a*'s hydrogen : *b*'s oxygen = 3: 0.5 = 6:1 and *c*'s hydrogen : *d*'s oxygen = 1.5 : 1. In other words, the water in *A* is divided in a completely different propor[tion] of hydrogen and oxygen than that in *B*; that is, **relative to the oxygen in both**, *A* has 4 times as much hydrogen as *B*. It follows from this experiment, which seems quite correct to me, that our investigations so far have not obtained oxygen and hydrogen in a ratio of 1:3 (by volume) or 85:15 (by weight) because water consists of these two substances, but because the galvanic forces at 2 solid or other conductors stood in such a relation to one another

that they were forced to yield such products, and that one only needs to create different circumstances in order to obtain different results. This experiment is actually due to our own Lord Steward von Hauch and is described in *Bibl. f. Physik etc* and in *Nordisches Archiv*[59]. Its true content had remained unknown to me and presumably also to you as well as to all other physicists because this excellent experimentalist had not drawn the conclusions which we see in it. However, it serves as new proof that a good physical experiment always keeps its value, and that the work of the same man who a few years ago so thoroughly overturned a number of false conceptions about water shall once again serve to cast a great light on this subject.

Ritter has repeated this experiment several times and found it perfectly confirmed. If the batteries are very powerful (e.g. of 600 layers), one does not obtain so strong a difference as when they are weaker (e.g. 100, as in v. Hauch's experiment). I have not performed enough experiments to draw a definite conclusion about Winterl, I can only assure you that he really has performed the experiments he describes, but that I have found him somewhat hasty in drawing conclusions from them, neither can one deny that he could have pursued many experiments further with very little effort. Today time does not permit me to tell you more about this, which I would otherwise like to do in order to obtain your judgement. But this work strikes me as being full of wonderful ideas, and it merits both a strict trial and a more complete development. I had started both, and I had almost finished the latter when I postponed it until later. Ritter has now encouraged me so much to complete it that I have begun again and can finish in a few days. He will get a publisher for me and will make much use of it in his subsequent work. As an introduction I hope to write a characterisation of this work so that no-one will have cause to reproach me with its publication, however the investigations of it may turn out.

You will see from the enclosed that I shall also go to Salzburg as you advised. I hope that you will be so good as to send the letters of

59. *Nordisches Archiv für Natur- und Arzneywissenschaft,* Copenhagen 1799-1805, edited by Christian Heinrich Pfaff and Paul Scheel.

introduction you promised me to Landshut, Salzburg or, if necessary, to Munich.

Although this letter is long, I am reluctant to end it. Be well and think of me as your friend, as always.
Your devoted
Ørsted.

Continuation of the travel journal:

From August 13th to September 4th, I have hardly had any occasion to keep a diary. I was with Ritter day after day, and when I was not with him, I was writing a chemical treatise on Winterl's chemistry, which is now ready for printing. Ritter has gone through it in order to correct the language mistakes which might occur here and there, and about which a native German, even less a foreigner, can hardly be too careful.

As I do not really recall what I told you about this excellent man the last time I was in Jena, but as I am sure that I did not say very much about him, I shall now quite briefly relate his biography, which may also interest the other readers of this letter. Ritter is the son of a clergyman in Silesia (in the village of Samitz) and attended a grammar school until his 14th year, when his father apprenticed him to an apothecary in Liegnitz. There he now studied, without any instruction, several of the old chemists' writings, of whose contents he possesses uncommon knowledge, and also applied himself to the study of mathematics without a teacher. What he really should have learned from his superiors had been rather neglected until he finished his apprenticeship and was now to work in the laboratory without previously having had any instruction in how to do so. As he was too proud to ask the advice of others, he now performed each task as an experiment and only achieved with much experimentation what others acquire more easily. However, he no longer took pleasure in the pursuits which were associated with his position at that time, and thirst for new knowledge drove him even more strongly to seek it elsewhere. Therefore he persuaded his father, who otherwise could not afford to support him, to give him the title to a hereditary claim, which he had so far been unable to collect

and therefore considered lost. With this claim, which was to be collected in the vicinity of Jena, he went to this university, where he led a miserable life for a couple of years, managing on this sum which he had to collect shilling by shilling. However, he studied hard and experimented with galvanism, which cost him little or nothing as one needed only to work with a few metal pieces at that time. The fruit of his investigations was the book which we possess under the title: *Beweiss dass ein beständiger Galvanismus den Lebensprocess begleitet*[60]. He first showed this work to Schmidt (who has written the *Philosophical Physiology*), and he advised him to send it to Reil in Halle for publication in his *Archiv für Physiologie*; but the latter refused to accept it and told Ritter that such a claim was too bold and a number of similar things. Ritter, however, knew that he had proved his assertions with mathematical evidence and therefore published this work on his own. It is not well written, but the system in it is excellent, and the proofs are adduced with a rigour that I have not found exceeded by any writer of physics, and I must admit that, on first reading it, I was cast into the same mood as when I first read Euclid. The experiments which are contained in this work were conducted with incomparable zeal, and not infrequently did he take zinc and silver plates with him to bed at night in order to make experiments on the effects of galvanism on the eye without being interrupted. This work, as well as many of those that followed, did not attract the due attention of physicists, but still there was no lack of individuals who, with deeper insight or perhaps feeling, knew how to appreciate what he had done. Among these was one von **Hardenberg**, whose writings are well-known under the assumed name of **Novalis**. As soon as this perspicacious man had read Ritter's book, he immediately left for Jena in order to make the acquaintance of the man whose genius he already admired. He found Ritter there in very poor circumstances and supported him, being a noble man of science who had a fortune himself. Ritter now became better known and got on friendly terms with Friedrich Schlegel and with Schelling, though the friendship with the latter did not last long; but out-

60. *Proof that a permanent galvanism is combined with the vital process* [*in the animal kingdom*] (1798).

side a circle of friends his worth was only imperfectly recognised, and his proof that galvanic circuits can be created with totally inorganic and totally organic bodies (the former in his *Beyträge*[61], the latter in his *Beweiss*) did not cause any great sensation. This may also have been due partly to the fact that he suspended his physical work for a long time and studied the poets until Volta's discovery again aroused his interest. He now found confirmed all that he had previously dared advance only as conjecture, and with renewed zeal he began work again. His discovery of the antiphlogistian error concerning the composition of water had greater justification than might be suspected, and the investigations which he made of the effect of the galvanic battery on the senses marked a new era for all those who studied them with due gravity. Only a few of his electrical experiments are known so far, and his experiments on light, which are so very important, have not yet found a single person who has tried to repeat them. However, Ritter continues to work patiently and continually discovers more of Nature's laws. Thus, he has recently found a mathematical law, according to which he can determine the position not only of the planets but also of the comets, and when he further pursues this discovery, he will be able to determine where to find each of the comets, which he has already done for some of them. He finds such similarity between the mutual relations of the celestial bodies and of the terrestrial elements that one, not without astonishment, here finds the beginning of a new astrology, though of a kind different from the one which they had a couple of centuries ago.

His writings are not clear, but they reflect the manner of his thinking; for when he finds an idea which seems true to him, he writes it down and pursues it to the limit, where he sees that it is, after all, false; now he seizes the opposite idea and pursues it in the same way until he often finds that neither is true by itself so that he must seek the truth in the combination of the two. Thus, the reader must often follow him in detailed and scrupulous investigations

61. *Beiträge zur nähern Kenntniss des Galvinismus und der Resultate seiner Untersuchung* (Contributions to a closer understanding of galvanism and the results of its investigation) (1800).

along the entire thorny road which he himself has walked, and this pleases few readers. Most people want to know within five minutes the results of that which has cost many years of diligent investigation. However, it is a beneficial consequence of this method that, by using it, he is not easily carried away but shows his investigations to his readers only when he is able to offer them results with indisputable justification. Recently he read such a treatise to Stransky and me, in which he first set forth Schelling's ideas, and Stransky found this excellently thought and expressed; but he soon turned things around and set forth Steffens', and Stransky was now quite convinced that he could agree with him, but no sooner had he done that than he showed that both ways of looking at the matter were one-sided, and only then did he set forth the right view.

As Ritter has no fortune himself, he seeks to obtain the support of now this, now that powerful man. Recently he has received much from the Duke of Gotha[62]. Last winter he lectured to the Court there, and next winter he will return there to make use of the large battery of 600 pairs of 25-square-inch plates, which the Duke has permitted him to have made at his expense. This battery will come to approximately 600 rd.

Ritter leads a very reclusive life, and when he is in the company of people who are not intimate friends, he is almost completely silent. This is mostly because he regards many of the people who insist on being considered enlightened as little more than riff-raff. – He likes the company of women and has had countless love affairs, about which he is not nearly so silent as the women who have favoured him might wish. He also talks about his other flaws with the same frankness, and I almost wish that he would restrain himself in this, for he has imitators who prefer to copy these rather than his diligence and conscientious care in the investigation of nature; unfortunately, he cannot communicate his genius to them.

One evening, when Ritter and I, in the company of several others, were at a beer garden outside Jena, a crazy woman came up to us. Ritter pretended to be mad and threw her crazy ideas into complete confusion. I think that he would actually have brought her to

62. Ernst II Ludwig (1745-1804), Duke of Sachsen-Gotha-Altenburg 1772-1804.

her senses if he had continued. He had at least already changed her considerably.

Of visits, I have only paid a couple to Göttling and one to the bookseller Fromman. The former took me to a gathering of professors at Professor Succov's, the latter invited me to dinner, where I was in the company of Ritter and the anatomist Loder. Succov also took me to the Society of Naturalists, which was just holding its quarterly meeting. There, Göttling gave a lecture on eudiometry as an introduction to another by Engineer Voigt, who showed several eudiometers, which he had wished to improve, but in which one did not even find all of the improvements made by others. The most interesting was a eudiometer with amalgam, according to Göttling's specifications. Voigt also wanted to demonstrate its use but handled it extremely poorly so that he finally broke Göttling's eudiometer.

Another engineer, Ottinie, has now settled in Jena. He has a connection to Court Councillor Voigt and has previously worked for Engineer Voigt, where he really produced the best things. His works are quite elegant, but he does not strike me as a mechanical genius.

On the 4th of September I left Jena, taking the mail coach to Bamberg. On this occasion I went through Rudolstadt, Saalfeldt and Coburg. Unfortunately, I passed through the first of these, which is said to have a beautiful location and beautiful gardens, at night, and I came through Coburg after having travelled two nights and was more concerned about sleep during the 4 hours that the coach stayed here than about seeing the sights. I can only say that Coburg has much more of the character of southern Germany, with its variegated magnificence, paintings on the houses, gilded and richly-coloured signs etc. My fellow travellers were varied but not very interesting. First, a recent graduate from Jena, quite stupid, then a wine merchant, later a woman and her daughter, who wanted to travel to France, a servant who pretended to be a merchant, and finally a student from Halle, who was the most interesting of them all. The woman was a dreadful person who allowed her poor daughter, a girl of 14 or 15, to starve as she only ate once a day and often only a single portion for both her and her daughter. She was not even willing to buy a glass of beer, and when I now and again offered the daughter some of mine, she was quite pleased. Moreover,

she raised my pity to its highest with the pitiless pedantry with which she constantly corrected the poor girl. She roused her several times from her sleep because she did not sit in the proper position.

Between Saalfeldt and Coburg I travelled through the Türinger Forest, where I walked more than rode in order to enjoy the fresh air and to avoid the bumps which the heavy coach gave on the rocky road. There were no views here of particular beauty.

The 6th. I came to Bamberg in the evening, on the same day that the Bavarian troops had arrived. The coach could scarcely get through the street where the coaching inn was because of the masses who had pressed together in order to hear the military music being played outside an officer's windows.

To Professor Manthey:

Bamberg, September 6th 1802

In one of your previous letters, you declare in your judgement of Winterl's chemistry that you do not agree with me, and that you would like to know the reasons why I think that it contains important truths. I undertake this task with pleasure and will strive to develop the basic ideas of W's theory from quite different experiments than those W. himself has performed. By thus starting from known and certain experiments, and not from the as yet untested observations of the Hungarian chemist, I gain doubly; partly in that I thereby show how many more reasons speak for the validity of W's ideas, and partly in that it gives me a firm point in common with you so that we can more easily agree, and what can be closer to me in such an important matter than to seek agreement with my teacher and friend.

The opposite electricities are the principles of acidity and alkalinity.

> We are led to this theorem already by the taste which is produced by electricity, which is clearly sour on one side and burning, like alkali, on the other. Experiments with the galvanic battery have also confirmed this. It is true that Simon did not obtain alkali and acid by galvanising fairly clean water when he used platina conductors, but

he did succeed with the same water when he used silver wire. It appears to be because some of the electricity is forced to remain in the water itself and does not evaporate into gas, and this condition is fulfilled when one of the metallic conductors is somewhat oxidized. From this it follows that

oxygen and **hydrogen** must be regarded, the former as an **acid**, the latter as an **alkali**.

When **oxygen** combines with **another body**, this becomes **acidic** to the same degree as the oxygen's **acid principle** (*+E*) is thereby **placed in a freer state**.

+E can also be **dominant** when **no oxygen** is present, and this also produces **acids**, e.g. sulphurated hydrogen.

The composition of many acids (perhaps all) consists merely in a certain **quantity of acid principle**; with **less** its **components could not remain combined** with one another.

Nitric acid serves as an excellent example here. Azote and oxygen do not combine with each other, but they do if they are given more acid principle from an electrical conductor.

When an **acid** and an **alkali** combine with one another, they mutually **cancel** or at least **weaken** each other's **forces**, as their characteristic principles are opposite.

The **more acid** there is in a salt, the **more the alkali is weakened**; the **more alkali**, the **more the acid is weakened**.

If one **separates the components in a neutral salt** from one another **without the addition** of new **acid principle**, one obtains them in a **less acidic** or **less alkaline** state than the one which they had in the salt. Thereby some lose the **acid principle or alkaline principle** which was necessary for their existence and appear only **separated** (*zerlegte*) (these are said to have a **dialytic** substratum from *διαλυω*), others remain **undisturbed** (have a **symplectic** substratum from *Συμπλεκω*).

From these principles we see that we are already able to predict what will happen when we distil potassium nitrate. The nitric acid in this

salt has lost part of its acid principle, and as this is required to hold its components together, it must separate, and what we obtain must not be nitric acid, but its components, oxygen and nitrogen gas. (Is it not astonishing that things which can be deduced from such clear principles, and which are so readily seen in experience have so long been buried in darkness?)

Caloric is not simple but consists of + and -*E*.

This theorem can properly be regarded as the basis of Winterl's system, and I would also have chosen to place it at the beginning if I had not found it more difficult to prove it there; for one of the main reasons for this law is that alkalis and strong acids (e.g. magnesia and concentrated sulphuric acid) give an intense heat upon combination. I find a second proof, which is perhaps even stronger, in that all changes in heat are accompanied by changes in electricity. This assertion, which can only be justified by a detailed inductive argument, finds sufficient confirmation in the scattered observations of physicists. One should include among the most important grounds for this belief that all friction produces heat and electricity. One has sometimes seen only heat, sometimes electricity, and I gladly admit that better observations are required for total confirmation. I am of the opinion that surfaces which are rubbed together must always produce heat, whereas one side must have + and the other -*E*. This would fail to happen only if the bodies were entirely homogeneous and in the same condition, but the more heterogeneous they are, the more clearly + and -*E* must appear.

The temperature which causes bodies to glow red also gives them acid principle.

Thus the oxygen gas which is driven from metallic calces is actually hyperoxidized, and it is because of this property that it so effectively supports combustion, even more than in its pure state. We also learn from this example that too much acid principle just as well as too little can cause oxygen to separate from a substratum. In prismatic experiments Ritter has proved that red light is oxidizing with phosphorus and half deoxidized horn silver. White light, and violet even more,

must deoxidize according to Ritter's experiments. This is consistent with Westrumb's experiments that white-glowing iron produced oxygen from water, as perfectly as if they had been planned for that purpose. – That vegetable acids decompose by being treated with nitric acid and heat is undoubtedly due to hyperoxidation. I presume that vegetable acids which are distilled with potash must give less carbonic acid and some azote (since carbonic acid and azote both consist of andronia and oxygen, the former merely has more acid principle and some water) or a deoxidized carbonic acid which must precipitate lime water only to make it transparent again in larger quantities. I find my presumption confirmed in the relations of the fatty oils. These can be regarded as acids on account of their effect on alkalis. As is well-known, they give carbonic acid gas and carbonic hydrogen gas when boiled, but when boiled with potash, they also give ammonia, thus azote.

Andronia is an acid matter which is contained in the majority of animal and vegetable substances, and which finds its opposite (Gegensatz) in an equally common basic substance, which can be called thelyke.

Carbonic acid consists of andronia, water, oxygen and acid principle. Azote of andronia, oxygen and perhaps basic (alkali) principle.

Every carbonization liberates some andronia. Therefore, impure potash always contains andronia. In his *Prolusiones*, pp. 172-176, Winterl has excellently shown how to separate it. Westrumb has obtained it in the same manner (see Crell's Ann. vol. 1. 1802).

Sulphuric acid dissolves andronia and thereby forms an acid which has a greater affinity to metals than to earths and more to these than to alkalis, and which dissolves all metals, including gold etc. W. has called this acid metallophilic acid.

Andronia is a component of all the **alkalis** and **earths** that W. has considered, and unless I am mistaken, this entire series consists of thelyke and andronia in various ratios. Silica contains most andronia and is closer to the acids than to the alkalis; alum already contains less andronia and more thelyke, and thus, e.g. magnesia must contain even more thelyke, potash still more, etc.

All metals also consist (in my belief) of andronia and thelyke.

Copper and andronia give molybdenum, tin consists of tungsten and andronia and a component as yet unknown. Barium consists of lead and andronia.

I find in these facts much that is in agreement with the idea that forms the basis of **Steffens'** *Beit. z. einem Naturgesch. der Erde*[63] and think that he would not have found himself disturbed by the many anomalies in his investigation if he had been familiar with W's work.

Now you have a report of the things that I have found in W's system. The narrow limits of a letter have not allowed me to do things as completely as I wished, and I hope you will forgive my lack of order as due to the superficiality with which I am forced to work while travelling.

It is quite remarkable for me to see how the spirit of the times is working towards the same goal from so many directions. With the antiphlogistic theory, all life and force had disappeared from chemistry, and people saw nothing but substances going in and out through larger or smaller pores, they knew not where, with greater and lesser speed, they knew not why, creating new qualities, they knew not how. **Kant's** dynamical *Naturphilosophie* broke the ice. But even most good minds did not know how to begin, they wanted to unite **Kant's** views with the traditional ones and were forced to declare (as Kant himself has done) that the combination could not continue infinitely (because this would require an infinite divisibility), and yet they would not give up the more important Kantian thought that the real chemical union consisted of two substances that filled space with identity. Little by little philosophers began to find their bearings in this system, but no experimenters intervened until Ritter showed, or rather began to show, that all matter can only be viewed as differences (poles) of an indifference (water). A matter which scarcely can be proved more clearly **in an experiment** than in the one which I took the liberty to draw your attention to in my last letter. Winterl's theory coincides completely with this although Winterl himself has not seen the full consequence. In all that **Kant** in his insightful speculation, **Winterl** in his diligent observations, Ritter in his thoughtful experiments, and **Steffens** in his

63. *Beiträge zur inneren Naturgeschichte der Erde* (1801).

poetic enthusiasm found in Nature, I see only a unity, however different the languages they speak, however far apart their starting points, and however unequal the degree of clarity may be to which each of them has brought things. Everything seems to me to encourage the most lively participation, *ne vitam silentis prætereamus*[64]. All current chemistry is shaken to its foundations and must fall; **Winterl** proves that there must be **other** substances, Ritter that things should not stop there, and **Berthollet** gives **the theory of affinities** a completely **new turn**. There is nothing for us but to help erect a new edifice since the old one is already dilapidated.

If you find Winterl's ideas as set forth here not entirely without basis, I beg you to send me your thoughts about them more often, and if you would also perform experiments on them, I would particularly like to hear about them. I have performed experiments on W's system, but I have found that one must perform very many in order to obtain a clear result, and therefore I have not got any further than to see that W. really has performed the experiments that he describes, but that he has often somewhat hastily given them their place; but it is **the whole** and not merely a **part** which must stand the test.

I am now publishing an exposition of W's system with an introduction, as the first part of a treatise which will serve to disseminate and test it. I can expect contributions from Rose and Ritter, and Ritter has promised me to deliver the entire second part. If you perform experiments according to W., I also hope for a contribution from you, either for or against as the truth will have it.

From the enclosed letter to the Duke of Augustenb[urg] you will see my plan for an easy way to acquire instruments. If you approve of it, I beg you to deliver the letter or, if you prefer, to give it to my brother to deal with. If you would support this plan by talking with Moldenhauer, Münter and other professors, you would do me a service without which I doubt that I shall achieve my goal.
Your devoted friend
Ørsted.

64. So that we shall not let life pass us by in silence.

I had finished this letter because I believed that the mail was just about to depart; now that I see that I was wrong, I want to add a few words. It would undoubtedly be a great advantage for me, if I were to start a chemical institute, if I were in a position to begin immediately with a collection of instruments worth a few thousand Rixd., and in any event such a collection would enable me to earn something from lectures when I come home, which would otherwise be almost impossible for me. For phys. and chem. cannot be learned without experiments, and it would probably not be well received if I were to lecture on speculative physics. The main issue, however, is that I deeply long to do something honourable and to work for my own benefit and enjoyment, of course in a scientific sense. Until I have succeeded, I cannot count myself happy. With the help of my chem. institute I could also obtain instruments but much later, and the first year or two would pass before I could really get started. If this plan should fail, I still hope for success but am not sure, would it not then be possible for the royal funds to assume this support under the same or at least tolerable conditions? And would it not in this case perhaps be useful to inform the party concerned of the entire plan for my institute?

Continuation of the travel journal:

On the 7th, I called on Court Councillor Markus. At first he left me standing in the middle of the floor, but after some minutes of conversation he became quite friendly, asked me to sit down and sat down next to me, and when I left, he thanked me most courteously for the interesting scientific news which I had told him and asked me to come and see him at the hospital the next morning. It is strange by what trivial means one can gain people's respect. He asked me what I thought about what had been said regarding carbon and nitrogen in the most recent philosophical journals, and when I told him that I did not think it correct and, further, informed him of some experiments which contradicted it, especially those by Winterl, he was very contented and told me that, in his practice, he had not been able to find any fundamental difference between azotic and carbonic medicines as between hydrogenous and oxygenous ones. In the afternoon

I went for a walk in the vicinity and found, on this occasion, many new ideas which so occupied me that I only thought of returning towards evening. Bamberg is surrounded by a variety of natural beauties, and the area is very fertile and mild as mountains to the north, the east, and the west shelter it from the winds.

Septemb.
On the 8th I went to the hospital to see this famous institution. I first met Prof. Döllinger, as Markus had not yet arrived. He received me with great courtesy and informed me that Markus had already told him about me. He took me through all the parts of the hospital and gave me the opportunity to admire the order and cleanliness which reigned there. There are no foul odours there, most of the rooms have a beautiful view, the air is constantly renewed with well-placed vent-holes. I went with Döllinger from the hospital to the court garden, where we spoke about Schelling's and Steffens' *Naturphilosophie*, about which D. had rather one-sided conceptions. He belongs to that category of scholars who know no better than to absorb such new ideas without really thinking about them themselves. It is convenient to say, as Aasheim used to do about such people, that they are **imbued** with a certain theory, but they have not **conceived** it from the inventor and **given birth to it themselves**. Unfortunately, most people are like that. In the garden I also met Winckelman, whom I became acquainted with in Jena, and Osiander, whom I had seen in Göttingen. In the afternoon I went with the man from Jena whom I had met in the coach to Altenburg, a mountain castle outside the town where Otto von Wittelsbach lies buried. From here one has a view over the entire town and its environs. It now belongs to Markus.

On the 9th I visited Markus and there found Rückert, who has published a book, *über eine durchaus praktische Philosophie*, and who is a friend of Weiss, whose brother has attempted to defend R´s system. R. and I visited Döllinger, who showed me his mineral collection and accompanied us to Buch, a place of entertainment not far from Bamberg frequented by students and others, including many women, and where there was dancing today, as there often is. They had nothing but waltzes. Anton Wall is right in saying that it is no long-

er the Dance of Amathonte. Much art is required to endow this dance with grace as most people turn it into a half-wild and half-clumsy phenomenon. (NB I must remark parenthetically that I am not of the opinion that those who want to censure something must be able to do it better themselves.)

The 10th. Yesterday Rückert and I had agreed to travel together to Erlangen. We did so today, arriving at this university town early in the evening. However, we found no-one at home and contented ourselves with a stroll in the court garden, which is quite nicely laid-out in the French style; there is a particularly tasteless fountain, which consists of a great many figures which are arranged so that one of the dead princes is sitting on the top, and water spouts from his baton. Around him are lords and ladies of the court, dressed in a rather old-fashioned French style, who are equipped with musical instruments of various sorts and are also fountains. Satyrs and the like are also found here and there.

On the 11th Rückert introduced me to Abicht, who is also a kind of philosopher and professor of philosophy here. He took us outside the town to a garden which has been opened for public entertainment by its owner, Postmaster Wells. In this garden there are an awful lot of displays, which are so crowded together that nothing has sufficient room. On the way home we met Professor Mehmel in a sort of public-house where the dignitaries of the town often come, and where, especially, they have very good beer. M. has been in Denmark as a private tutor and understands some Danish. This afternoon was the first time I was able to find Hildebrandt at home. He is so busy with his medical practice, with lectures, with official duties and the like that it is only possible to see him for an hour each day. When I visited him, he was busy with proofs, so I soon left him again but with the understanding that I was to return in an hour in order to accompany him to a charlatan who demonstrated his experiments this evening. We found it moderately amusing and parted without having spoken much to each other, but he invited me for tomorrow afternoon.

On the 12th I visited Mehmel, and he took me to Schreber, who is not easy to get access to. He was very courteous but did not offer to show me anything of his collections, which I knew he is very re-

luctant to do. Mehmel also took me to a Professor Ortloff, who had previously been a shoemaker and has over a period of 9 or 10 years acquired a level of learning above the ordinary. He is really an encyclopædist and has quite good encyclopædic knowledge in philosophy, physics, chemistry, etc. M. also took me to Privy Councillor Wendt, a brother of *Conferenzraad*[65] Wendt in Copenhagen. I spent the afternoon with Hildebrandt, who showed me the university's and his own physical and chemical apparatus. Since Meyer came to Göttingen, he has lectured on both physics and chemistry and, as far as I know, medicine as well. In the evening I went to the theatre and saw *Medea*[66], a melodrama, and another minor play performed badly. The playhouse is beautiful.

The 13th. A visit from Ortloff. He was with me all morning, and we conversed very pleasantly about philosophy and speculative physics. I gave him Mendel's translation of my *Naturmetaphysik*, in which he wrote the place and the date of my birth in order to include me in Meusel's *gelerhtes Deutschl.*, for which he works. After dinner I visited Professor Espern in order to see his collection. He is an old, deaf and rather strange man, who at first, when I failed to ask to see something, thought that I was a beggar or at least someone who wanted support from the university, and when I had removed this misapprehension, which I am certain neither my appearance nor my words had occasioned, he asked me how he might be of service to me, to which I responded that I wished to see his collection of minerals. I have never encountered anyone so modest that he could not believe that one would visit him for his own sake but rather must have some other motive. This evening they performed the tragedy *Agnes Bernauerin*[67] so badly that the audience laughed all the way through it, and with good cause.

The 14th visited Ortloff, who showed me a most promising history of literature, which he is working on at the moment. He invit-

65. A high Danish title, now obselete; originally a royal councillor in important matters of state.

66. Presumably *Medea* (1648), a drama in verse, based on classical authors, by Jan Six (1618-1700).

67. *Agnes Bernauerin: Ein vaterlandisches Trauerspiel* (1780) by Josef August Graf von Törring (1753-1826) about Agnes Bernauer (ca. 1410-35).

ed me to become a contributor to an encyclopædic magazine which he is going to publish. Today I attended Hildebrandt's lecture. He lectured on light and dealt with the dispute between Euler's and Newton's theories, without appropriate thoroughness but still much as the majority of chemists and physicists deal with it. One can but lament the nonsense with which people who could do better things trouble themselves and their students merely because they waste their effort on a thousand things which really ought to be dealt with as one. Hildebrandt lectures with much clarity and is not committed to the words of any one theory; he would only have to know them better to follow one. – Today I also took leave of the others.

The 15th with the mail coach to Nürrnberg. My party consisted of 3 old crones and a person whom I did not quite know what to make of at first; I thought I had seen him at Ortloff's yesterday. To my delight he soon complained in very careful Latin about our misfortune to be thus locked up with 3 crones. I now saw that he was a person one could talk to, and I also learned that he really was the same person that I had seen yesterday at Ortloff's, where I had not really had the best impression of him since he had incessantly beaten a small boy he had with him in order to make him be quiet. In Nürrnberg he introduced me to a certain Roetter, the steward of a baron. This R. has taken me around a little in Nürnb. I had been told that I needed only visit v. Murr in order to see everything of interest here. I found this not to be the case as he was so busy telling me about his writings, of which he gave me 3 pieces in addition to a catalogue of a number of writings that he wanted to sell, that he could scarcely talk about anything else. M. is a person who at some point possessed what one used to call enlightenment and still believes himself to be so blessed and likes to provide others with the benefits of it against their will. He told me how much good the antiphlogistic theory had done by proving that metals are elementary and therefore cannot be produced so that alchemy had been completely eliminated. I remained completely silent through this as I had already seen that he was too weak to appreciate proofs of the possibility of the contrary. If Murr has any learning, it consists of literature proper and perhaps

history. In the evening I saw a play, *List gegen Mistrauen*[68], in which a Mlle Wetzel and a Mr. Miedke acted alone and very well. In addition, they performed Iffland's *der Komet*[69], which was not done badly either.

The 16th. I walked around with Roetter today and saw the castle and various other sights. Near the castle is a tower, where unmarried women who give birth are confined without mercy for 4 weeks, and neither class nor money can save them. At a turner's I saw several small figures which were unaffected and in excellent taste. He did the more difficult work himself, and his wife and the rest of the family had to colour them. Most houses in Nürrnberg are painted, and many not badly. One sees paintings of both heathen and Christian mythology, and now and then emblems of the owners' trades. A painted house near a bridge, I think it was called *die Fleischbrücke*, is known by the name of the Nürrnberger Wahrzeichen. Near one of the bridges is an ox carved in stone under which is written "*hier ist der Oxe der ein Kalb war.*"

On the 17th I saw *die Rothschmidtmühle*, where they work primarily with brass but also manufacture razors and the like. The cast brass is turned and polished, and the lathes, as well as all the other machinery, are driven by a waterwheel in the Radnitz River. I met a foreman who showed me a great deal, but when I gave him 2 *Kopfstück* (about 2 marks 8 *skilling*) on leaving, he showed me even more. Later today I left with a return wagon for Regensburg, and arrived there in the evening of the 18th.

It was very difficult to find a room, but I got one in one of the best inns, called *Zum weissen Lam*. The many foreign diplomats and agents and a trade fair, to which the merchants flocked, filled the town with visitors. The company at dinner was good although I heard little of interest, and it seems as though people in this town, where such important political subjects are dealt with, are quite unconcerned about politics.

The 19th. The cathedral is one of the sights here. It is an old building in the Gothic style and very solemn indeed. One finds

68. Comedy in one act (1806) by August v. Kotzebue.
69. Farce (1798) by August Wilhelm Iffland.

here the gospel of Christ feeding the 5000 carved in marble, rich in figures but poorly crafted, and I was genuinely uncertain about which of them was Christ. A church warden ran about, showed me everything and even called me "your excellency"; all the same, I put him off with 12 *Kreutzer* (a little more than 10 *skilling*), which still seemed to satisfy him. The most pleasant thing that has happened to me for a long time was seeing the collection of physical instruments in the Benedictine monastery of St. Emmeran. I did not expect anything exceptional but still wanted to see it, so I was surprised when I was told that I had to apply to Prof. Placidus. I did not know that he was here but knew him from a treatise in the annals of the Bavarian Academy which was not bad for its time. Therefore I paid him my compliments, and we immediately became friends. He showed me the collection of instruments, which was one of the richest I have seen, clean and neat, and quite complete for a collection intended for use in lectures. Moreover, it contained a number of instruments that were partly of Placidi own invention, partly excellently crafted, often according to an improved design. We parted well pleased. At the dinner table I made the acquaintance of a French merchant, who spoke no German and therefore stuck to me as a fellow stranger. We went to the theatre together to see *General Schlenzheim*[70]. It was advertised on a poster that the audience would see a battle, hear bugle calls, etc. The stage was in the open air on an island in the Danube. We did see all of the spectacles advertised, but the acting was poor, and the play, which requires many changes of scenery, had to be performed in one place. The same troupe usually performs in the playhouse in the town. The performance began at 3½ o'clock and ended at 5 or 5½, after which we saw all the tattered actors go home. In the evening I went with my Frenchman to a coffee-house, where we saw wax figures of the great robber Schinderhannes and his gang and later played billiards.

Your
Christian.

70. *General Schlenzheim und seine Familie* (1784) by Christian Heinrich Spiess (1755-99).

Continuation of the travel journal:

September

On the 20th I went to Citizen Bacher, the French chargé d'affaires, with my passport to get it signed so that I can travel in France. I paid him the compliments due a respected man, and he was most affable. It is completely free to get such a signature in one's passport, which is why so many take their passports to the embassies rather than to the authorities, which is otherwise sufficient. Today I went to a bookseller Weiss to buy a couple of necessary books, and on this occasion I entered into a conversation with him about Winterl's chemistry with regard to publication, and I succeeded in getting him to purchase my manuscript about Winterl. I received 60 guilders, which, however, was not so important to me as having it printed. It is very difficult to find a publisher here for one's first work. The publishers are an unhappy lot who have no understanding of the contents and therefore must go by the name. I can quite safely count on getting 2 *Louis d'Or* per sheet for the second part; the amount I received for this one has been calculated to be about 1 *Louis d'Or* per sheet. I would hardly have got any honorarium at all if it had not been for Mendel's translation of my *Naturmetaphysik*, where I am highly praised in the introduction. The title of my treatise is *Materialien zu einer Chemie des neunzehnde Jahrhunderts*, part 1.

Regensburg has a promenade around the town, or rather around one part of the town, but strikes me as being quite poor in this regard in comparison with other towns of the same size.

In the company of my Frenchman, I visited a wine house and the coffee-house with Schinderhannes again this evening. It amuses me to see how he mingles with all kinds of people, women as well as men, with so much more ease than I or Germans in general. I must regard this as a quite useful rule for my stay in France.

On the 21st I took the mail coach to Landshut. In the coach I found a retired state notary. Since so many cases are now decided by the sword, there was less work for him. This and other unhappy circumstances had brought him to such poverty that he was unable to give his wife and children, who were travelling to München, more

than one guilder in travel money for this journey of 17 miles. As I had become 60 guilders richer yesterday, I felt obliged to give him one, whereby I doubled his fortune, and he immediately used it for his wife, who was already in the coach, and was deeply appreciative. Her conversation with a lady travelling with us gave me the opportunity to confirm my earlier conviction that I had not been misled by a false tale. Along the way, we were joined by a clergyman who was eager to display his enlightenment, but unfortunately he was awfully ignorant, and everything he did to conceal this only made him more ridiculous.

When I arrived at the inn, *die goldene Sonne*, I found two other guests there, one of which, without knowing other than that I was a travelling chemist, immediately offered to take me to Professor Bertele the following day. He also offered to speak either French or Italian with me if I preferred that to German. When I asked his name, my neighbour answered that he was Mr. von Hepp from München, whereupon he complained that people could not forget that "von", assured me that nothing could be of less importance to him, and asked if we had something similar at home. I responded that we certainly had nobility, but that they were not well liked, whereupon he immediately turned the conversation to another subject and thus confirmed my surmise that he was not so indifferent to the little "von" after all.

The 22nd. On the following day I waited in vain for Hepp and thus wasted the time I should have had to visit scholars today. However, some new books and the beautiful countryside around the town gave me a useful and pleasant way to pass the time.

From the 23rd to today, the 27th, I have visited and become acquainted with the scholars who were of greatest interest to me. I have often visited them, walked with them and the like, but have not received even a single invitation, as has also been the case elsewhere since I left Jena. Bertele is the professor of chemistry here. He has rarely entered into scientific conversations, but the little I have got out of him convinces me that he is weak. Today Roeschlaub has strengthened this conviction with his assurances.

Roeschlaub is interesting. He shows himself to be lively, acute and witty at every opportunity, but he is as courteous in company

as he is bitter in his writings. However, I have heard him contradict a Prof. Niederhuber quite strongly but in a sufficiently witty and elegant manner that he did not violate the rules of polite society.

I have so won over Schrank with a few compliments that I have gained his complete confidence. He told me that he is not only so practised a writer that he puts down his pen in the middle of a sentence when it is time for him to give his lectures (which he does not prepare) and takes it up again and continues writing when he returns, but he even assured me that he had once slept during one of his own lectures without anyone noticing it.

Knogler is the professor of mathematics and astronomy here, and he is working on the plans for the astron. obser. which is to be built here.

I have found a most worthy man in a Professor Winter, who is really a surgeon and speaks with such warmth about his surgical operations as I have seldom encountered in anyone. He is said to have performed a number of very difficult operations here with great success.

To Professor Manthey:

Landshut, September 26th

I have so little time at the moment that I can only inform you that the money I have received should be sufficient to provide for me until I get to Paris. I expect to be there within 4 weeks and ask that you arrange for me to find there a letter of credit for such a sum as you feel that I need; for if there might be something left upon my arrival, it will undoubtedly not last long as the first days will surely make several expenses necessary. Letters to me can be addressed to Heiberg, rue victoire No. 2 chez le négociant Pobechheim. If you would prefer not to use this address, I ask you to send it in another way, perhaps to Commercial Secretary Classen.

I hope that you have received my letter to the Duke of Aug. I forgot to mention in my last letter that I ask your assistance also with the Duke if you approve of my plan. This is only because I am so accustomed to your promoting my happiness in so many ways

that I often think it self-evident that you will continue to do so; but truth and gratefulness oblige me to tell you that I feel the necessity of your involvement.
With respect and friendship
Ørsted.

Continuation of the travel journal:

On the 28th I travelled with the mail coach from Landshut to Salzburg. This is the first time that I have had a relatively fast journey here in Germany. I covered 18 miles in 22 hours, but this way of travelling is also more expensive than I had imagined. One pays for one horse and the *post-chaise*, which comes to 1 ½ guilders per station. One is further obliged to tip the coachman 24 *Kreutzer*, and ½ guilder is very frugal. Thus, every station amounts to 2 guilders, or 1 guilder per mile, which is as much as a hired coach costs at home. And still that is not all since one has to pay mileage and the like at almost every station so that I have paid 1 guilder for every hour of the journey, including meals.

On the 29th the mail brought me a letter from Professor Manthey with letters of introduction to Moll and Vierthaler here. I really wanted the postmaster to give me another letter from a certain Sophie in Copenhagen, but he assured me that there simply were no more, so I had to be satisfied though reluctantly. The first scholar I visited here was Hertenkeil, who seemed to be very busy. I thought he was engaged in medical practice, but I hear that it is actually commercial practice. He is involved with everyone who runs a business, not just booksellers, and he has recently suffered a loss of 20,000 guilders due to a bankruptcy. Hertenkeil had his servant take me to Dr. Schelhammer, whom he praised highly. I was quite pleased with this because I knew that Sch. was acquainted with several of my countrymen in Paris, including Möller. Therefore we were soon old friends, and the same morning S. took me to a picture gallery which is quite interesting of its kind; it consists of portraits which are mostly of the artists themselves. One finds works by the most famous masters there. Of all these depictions of themselves, I most appreciated one in which the painter had shown himself paint-

ing his own portrait and looking at his own image in a mirror. The difference between real life, the image in the mirror, and the painter's work of art struck me as successful and executed with deep insight. In the afternoon I visited Moll, who received me very warmly and spoke with me for more than 2 hours. He is greatly interested in Danish literature and knows it quite well.

The 30th. I visited Vierthaler in the morning, and after receiving some information from him about the area, I proceeded later that morning to **Hallein**, where the most important salt mine is. I have never seen such an impressive mine. One either walks through properly excavated galleries or slides down smooth logs so that it only requires a few minutes to descend more than 100 feet without any danger. In order to go down here, one is given a white suit which is worn over one's other clothes, a leather bag and a glove for the right hand in order to hold on to a rope while one slides down. Without these, one would certainly be burned by the intense heat created by the rapid slide. In the mine, large holes are filled with water which dissolves the salt and is then led by channels down to the town, where it is boiled. Such a large space was illuminated that I could see everything. Here one finds something which is not usually found in mines, that is, statues of men who have had great influence here. The exit from the mine took place on a kind of wagon, really a board with wheels under it, which is pulled and pushed by the miners. One gallery of a length of 1000 fathoms, 6000 feet can thus be traversed in 10 minutes so that one travels a good deal faster than with a hired coach. – In the town of Hallein are the salt pans which are quite indifferently arranged. I returned to the inn some time around 7, as tired as one can be after walking for 3 or 4 hours in considerable heat, climbing a large mountain, and then walking through it, and on top of all this having had a very poor dinner.

October

On the 1st I walked to Berchtoldsgaden, over a tree-grown mountain which was quite difficult to climb. After 3 hours, when I was quite happy and imagined that I had completed my walk because I was now at Berchtoldsgaden, I received the [dis]agreeable news that I still had 1 ½ hours to walk in order to reach Lake Bertholomäus,

which was what I actually wanted to see. The route there was quite agreeable, but the most beautiful thing was the lake. I took a boat with a fisherman and sailed on it. The sun shone brightly, the waves rolled like small prismatic wrinkles on the water and cast a thousand coloured images on the white sandy bottom. I was surrounded by mountains, many eternally capped with snow on their peaks, which at a distance created dazzling mirrors which conveyed the whitest light to the eyes. On the lake and at the foot of the mountains we still had high summer, and it seemed almost as if the trees here had a brighter green and the grass a more abundant growth from the nourishing humidity with which the lake always protects its neighbours from dying of thirst. We sailed perhaps ¾ mile to get to a castle where they catch a fish which is here called *Schwartzreuter*[71]. Tasting it is part of a visit to Lake Bartholomäus. I asked for some and was given a portion which seemed to be enough for two. However, I found it so tasty and light, and exercise had given me such a large appetite that I ate it all. Night overtook me on the way back to Salzburg so that, in order to get on, I had to hire a carriage from a landlord in Schelenberg. On this occasion I met a guest who spoke Danish and Swedish, and who assured me that he had been a Catholic priest in Copenhagen. He expressed himself poorly in Danish and started to speak French. He told me that he was born a Hungarian and offered to speak to me in Latin, which is the everyday language in Hungary. I answered that even though I had studied many Latin writers, I had not practised speaking it. He seemed not quite to understand this, and he answered that I might have forgotten it. As this roused my ambition, I told him in Latin that he knew that practice was the best school mistress, and that one could not speak a language easily without it even if one understood it well. He answered me again in Latin, and thus we came to speak it against my will and conversed in this language for some time, which I did all the more willingly when I discovered that I was far better than he, and that my fear of speaking Latin with a Hungarian was groundless. He frequently committed the grossest errors, e.g. the king's son was *filius rex* to him without any more ado.

71. Char.

October

On the 2nd, I paid an early visit to Vierthaler, who sent for a Dr. Wagner, who wanted to make my acquaintance. He is an ardent follower of Schelling and wants to write a complete philosophical physics, but without knowing nature except from text-books and without arguing philosophically with the stringency of Kant, exactly like his master. These people try to sell lame philosophical proofs and crooked physical theories and then complain that others will not accept them. I always pester these people with Steffens, who has seen nature with his own eyes and thought about it with his own head. Wagner recently wrote a new theory of light and heat, in which he sets out to prove that these have no chemical effects. I caused him no little embarrassment when I adduced Ritter's experiments on light, which were still unknown to him. He had claimed that heat could do the same as light and adduced, in favour of this claim, that he had seen in the latest French journals that iron and several other metals could be reduced by mere heat. I assured him that this was not what was meant, but that the expression "by fire alone" meant without the addition of a combustible substance. But why had they not said so, he asked. Because this is a matter which is so well known to us empiricists that there is no need to say it, I answered. These, and other mistakes of which I convinced him, made him somewhat tame so that I think that if I had had the opportunity to spend some more time with him, I would have got him to learn something proper or to stay away from it altogether. In the company of our philosopher, I saw a so-called natural wonder, in which art had no small share; it bears the name of *das steinerne Theater*, a cave with an elevation reached by some stone steps. The most beautiful thing is that everything is surrounded by shady trees, whose twilight lends it a romantic touch. I saw the Hellbrunn garden on the same occasion and found that it, like so many other gardens, is more famous than beautiful. In the evening I took leave of Vierthhaler. v. Moll gave me a little box with minerals for Häuy in Paris.

On the morning of the 3rd I left on the mail coach to München, where I arrived on the 4th in the afternoon. As it was too late to visit anyone, I took an aimless stroll, and by following others who

also appeared to be out for a walk I came to a promenade which consisted of a number of intersecting avenues. I have since learned that this place is called *Hofgarten*. By walking across it and going through a gate, I came to an English garden, which I soon discovered to be so extensive that I needed several hours to get to know it. I lost myself in it with pleasure and did not think of returning home until it became dark. It took some time before I found the right way, and I was not home until about 8 o'clock. This park is due to Count Rumford, for whom they have placed a well-deserved monument here. This park is more interesting because of the taste with which it has been executed than because of the money required to make it. Now you think that you are walking along a well-trodden path, which winds through a pleasant wooded area, now you are wandering along the bank of a river. When you turn to one side from the path and approach the edge of this large garden, you encounter villages, a few buildings, fields which are surrounded by the garden etc. Near München there is also an inn in this garden.

Early on the 5th I visited Director Flurl. He told me about some other scholars there, including Prof. Maximus Imhof, a monk who is responsible for the collection of physical instruments here. I found him to be a not ill-informed man. He told me that he had performed important experiments with galvanism, particularly on the effect of the voltaic cell on gases. He showed little willingness to tell me the result of his investigations, which he told me were soon to be published. Flurl had also directed my attention to Apothecary Ziegel as a good chemist. I found him to be quite a sensible fellow but a very meagre acquaintance. I only learned from him that pharmacy here, as in so many places, is in the most dreadful state, and that there were few signs of improvement. In the evening I saw a poor comedy by Kotzebue.

The 6th. Count Rumford is staying here at the moment. Today I spent almost all morning with him. He is very courteous and eagerly showed me the instruments with which he will conduct experiments on heat this winter. He has great mechanical genius. At dinner my host introduced me to a mine supervisor Gilbert, saying that he was a good chemist. I found him of more than average ability and spent most of the afternoon with him.

The 7th. Today I made the acquaintance of a man whom I have long wanted to meet, that is, *Directorialrat* **Franz Baader**, whose writings on *Naturphilosophie* are so beautiful that one must want to make the acquaintance of the author and often so obscure that one needs it in order to have some explanations. I find his company most interesting. A man of such ardor and such life is rare. I had hardly spoken with him for 8 minutes when he already offered to give me some letters of introduction for Paris. This afternoon I went with *Direktor* Flurl to visit the porcelain factory in Nymphenburg. It did not seem particularly significant to me, as little as the famous garden in whose vicinity it is located.

The 8th. The academy here has a collection of physical instruments which is fairly useful but not so good as the one in Regensburg. Professor Imhof had promised to show it to me but was not present when I arrived by appointment. Therefore, I had the collection shown to me by a young man who assists Imhof. The library here is rather large but hardly carefully selected. Like the instruments, it is placed in the building of the Jesuit college. Flurl owns a rather good collection of minerals, which he showed to me and a few others today.

The 9th. This morning I called on Baader, who is at home only in the mornings as he is moving at the moment. As a result, I cannot profit so much from his company as I wished; but the best thing is, however, that conversation with him proceeds very rapidly so that we are able to talk about many things in a short time. He left with me in order to perform several errands, but he often remained standing in the middle of the road in order to explain one of his ideas to me. He is quite insistent that moral and physical nature are very closely connected, and that physics really has no value without such a connection. In this respect, he quite agrees with Ritter, and I with both of them. It is only that Ritter is too clever to express a public opinion on this until, through his experiments, he has overthrown the gross materialism which now prevails; we shall then expect glorious ideas of this kind from him. Here is one of Baader's, which can shed light on his entire system. The corruption of the mind is a sin, that of matter a disease; the latter is a consequence of the former. NB. Originally, in the present course of nature so many

complications exist that the connection is not easily recognized.[72] We also find this in the mythology of all peoples and, as is well-known, also in Christian mythology. The materialists are quite consistent when they say that moral error derives from that of matter, from disease. – Today in the company of a certain **von Hopfer** I saw the picture gallery here. It is not bad but cannot be compared with the one in Dresden. The collection is organised neither by schools nor eras or the like but, as one is assured, by artistic merit. That seems to be the worst principle imaginable, since no gallery director has sufficient insight to determine the merits of every work. – There is a chapel in the castle, called *die reiche Kapelle*, in which all requisites for the celebration of the Catholic faith are to be found in the most expensive form. Gold, silver, pearls and gemstones are lavished upon them although I doubt that the lot is worth more than a hat band set with diamonds that I saw in *das grüne Gewölbe* in Dresden. Aside from that, the interior of the castle is not of interest, and a collection of miniature paintings which I had understood to be of importance was beneath criticism. In the evening von Hopfer took me to a beer garden, where I heard the journeymen's way of being merry. I found it remarkable that they sang so many student songs and so many satirical songs about the clergy in this utterly Catholic country. Schiller's *Ein freies Leben führen wir* and *Frisch auf Kammeraden* etc. are not forgotten, and especially the first seems quite popular for its coarseness.

The 10th. A visit from **Franz Baader**, who was accompanied by his younger brother **Mathias**. The latter has applied himself especially to salt-mining and seems to be uncommonly knowledgeable about this. I used the afternoon to wander through the English garden, outside the town, in a direction other than the one I had chosen the first time, and found it most enjoyable. I think that this garden is almost ¼ mile in one direction and ½ m. in the other. In the evening, the comedy *Liebe und Freundschaft*[73].

I spent the 11th, 12th, and 13th partly in the company of Mathias Baader and Franz Baader and partly visiting the picture gallery

72. This notabene has been added in the margin.

73. A play in 5 acts (1787) by Christian August Vulpius (1762-1827).

more often, taking walks outside the town, and the like. In the evening of the 12th, a new comedy called *Der Puls*[74] by Babo, who is the manager of the theatre here, was presented and followed by a ballet, *Das Urtheil von Paris*[75]. They had undoubtedly taken great pains since it was the Prince's birthday, but the ballet was still very poor. The three goddesses looked more like washerwomen, and Venus did not even have a costume that made her worthy of the prize. M. Baader remarked that she was actually very natural and appropriate as Venus vulgivaga[76]. Only a single dancer showed herself to advantage; she played a nymph who loved Paris. In the evening of the 13th I was invited by my host to a little concert given by him, his wife and a few good friends.

Before the concert began I made the acquaintance of a certain **Spaun**, who is very interested in physics and is working on the publication of experiments intended to disprove Newton's theory of light. He had many good ideas, but I cannot tell whether they were his own. It is at least certain that others, particularly Ritter and Göthe, have had them before, and the former far better. However, the man seemed to be quite unread and could well have stumbled upon them himself.

On the 14th, I left for Augsburg in the company of von Hopfer. A Jewish girl also travelled with us. She was going home for her wedding to a young man, but she showed such interest in being unfaithful to her husband even before the wedding that I was really astounded. Hopfer has an extraordinary way of dealing with such people, and he easily got her to promise that she would visit him in Augsburg.

On the 15th I visited von Cobres, a merchant who has a large library and a natural history collection. He told me that he would be unable to show it to me for 3 days, so I left Augsburg on the same day with a return-chaisse, which took me to Stuttgart (18 miles) for 9 guilders, or about 5 rd. On this journey I had the most enjoyable

74. A play (first printed in 1805) by Joseph Marius Babo (1756-1822).

75. *The Judgement of Paris* (1801) by Pavel Wranitzky (1756-1800).

76. Epithet for Venus, with reference to purely sensual love (= who roams among ordinary people).

company of a merchant from Frankfurt by the name of **Perret**, who judged all things with such a philosophical certainty and with such a depth of consideration that I must regard him as a very unusual person. A *Magister* **Heid** joined us for the last miles. He was not without reading though not to my taste, but he did provide me with a good empirical proof of the opinion I have long held that Schelling is among philosophers what Schiller is among poets. He valued Schiller more highly than Göthe, and Schelling more highly than Fichte. He thus placed together the same people as I do but with the difference that he placed higher those I place lower. Although I do not know why, he quoted a couple of lines by Schiller, which say: Why are genius and taste so seldom united? Because the latter fears wings, and the former scorns the bridle. There is little that so beautifully illustrates the difference between Schiller and Göthe as the comparison between the previous quotation and the following by the latter:

> "Wodurch [giebt] sich der Genius kund? Wodurch der schöpfer in der Natur
> [...] Klar ist der Æther, und doch von unergründlicher Tiefe
> Offen dem Auge, dem Verstand bleibt er am ewig Geheim."[77]

My opponent could not deny that there was both more poetry and deeper meaning in the latter than in the former.

On the 18th, I called on Court Physician Jäger, who received me very amicably and took me to a wine harvest at the home of his father-in-law, Court Councillor Pfaff. This was the first wine harvest I had attended, so I found it quite interesting. A wine harvest is really a celebration to which the owner of a vineyard invites all his friends, and where the young in particular take the leading part. Games, dancing, fireworks, and the like are the main ingredients in such a celebration. We gathered in the vineyard already at 2 o'clock in the

77. "How is genius revealed? How the Creator in Nature [...] / The aether is clear but infinitely deep/Open to the eye, but an eternal mystery to the understanding." Both quotes are from the collection of epigrams, *Tabulae votivae*, published in Schiller's *Musenalmanach für das Jahr* 1797, pp. 173-74.

afternoon, and it was not long before first games, then dancing and, after dark, fireworks followed, one upon the other. Everybody got a great many little rockets, which were sold there, and distributed some of them among the women while they fired others themselves. Finally, a major fireworks was let off, which did not look bad. Then the entire company went into the town amidst resounding playing and singing, cheered Pfaff outside his door, and spent the rest of the evening with him.

On the 19th I visited Jäger early in the morning and stayed there for a long time with Tutor Pfaff, a brother of Prof. Pfaff in Kiel, and also made the acquaintance of a certain Dr. Gmelin there. In the afternoon I visited Mrs. Osiander, the mother of Dr. Osiander, whom I had seen in Göttingen and Bamberg.

The 20th. With Jäger in the morning and also in the evening by invitation. A kinswoman of J.'s, who is visiting from the country, came home from a wine harvest while I was there. Mrs. Jäger asked her if she had sung *Der Reiter und sein muthiges Ross* etc.[78] That reminds me that this is one of the favourite songs of the ladies here, and at the wine harvest I heard them sing with much feeling:

"Er wirbet nicht lange, er [zeiget] nicht Gold
Mit Sturm erringt er den Minnesold."[79]

It is quite strange that this rider's song, which Schiller wrote in the rudest soldiers' taste of the seventeenth century, thus becomes a ladies' song, a lack of delicacy and feeling of decency, – on which one could write a whole sheet in *Tilskueren*, without anybody taking any notice.

Apart from this, I have mostly spent these last 3 days thinking, and I hope to have found something not unimportant, which I cannot relate here.

On the 21st, I went to Tübingen and stayed there until the 29th. Here I put the ideas that I had recently into a treatise which I have

78. "The rider and his brave horse" from *Reiterlied*, a popular song with text by Schiller, *Musenalmanach für das Jahr 1798*, pp. 137-40.

79. "He does not plead, nor gold display/By storm claims love as knightly pay."

completed, not without effort but, I hope, not without success either. My acquaintances here are: **Kielmeyer**, one of the greatest minds I know. He has published very little, but this is glorious, and I have now seen some of his pamphlets on chemistry, which are quite excellent. Already more than 10 years ago, he advanced all the most important ideas which galvanism now inspires in us. He is also excellent in botany and zoology. **Cuvier** in Paris is his pupil and confesses that he owes much to K. He has given me a letter of introduction to this scholar. He has also, for a long time, entertained the ideas which I have developed in my new treatise, and when I informed him of mine, he was greatly astonished and believed that I must have used his pamphlets for a long time. I therefore gave him my treatise, from which he saw that I had arrived at this in a completely different way, and I also told him about other ideas which I knew he entertained as well, but on which I had reflected further. – Kielmeyer's father is a gamekeeper, who took him shooting as a boy. The Prince, who saw him there, was so attracted by his open and brilliant physiognomy that he granted him his special favour and allowed him to study at the academy which was then to be found in Stuttgart. There the young Kielmeyer made so much progress that, at the age of 18, he became a teacher at the school where he was recently a pupil, and he had an extremely advantageous position here until the Prince died, and the new Prince dissolved the academy without giving K. his full pay but removed him to Tübingen, where he did not become a member of the faculty until last year. This circumstance has made him so dissatisfied that we hardly dare expect writings from him, especially now that he must also lecture on *materia medica*[80]. A quite unusual memory, ingenuity (in combinations), and powers of observation are the gifts which are particularly characteristic of K., though his ideas do not lack other mental faculties. – Kielmeyer is severe in his judgements without, however, being unfair. Concerning Blumenbach he said, among other things, that he had been a lecherous student who had not spent his time well but otherwise could probably have gone far.

80. The body of knowledge about the therapeutic properties of substances.

He had not known himself what he wanted with his **Bildungstrieb**[81] until Kant had opened his eyes. Concerning the present description of nature, he says that he is surprised that so far no academy has offered a prize for the invention of a machine for description, which does not really require any intelligence. **Autenrieth** is here, too. He is terribly argumentative and contradicts people even before they have finished talking. He has good powers of observation but poor judgement. He has travelled much and has visited America, among other places.

Storr is a rich man who, due to indolence and illness, has resigned his professorship. He has a large collection of minerals which he could not show me because it was not in his house, and since he had a bad foot, he was afraid of catching a chill if he went out. Bonenberger, a son of the man known for his electrical experiments, is professor of astronomy here. He has good mechanical knowledge.

I met daily with a Doctor Emmert, who in collaboration with Reuss in Göttingen has performed analyses of animal substances. He showed me great courtesy and has, among other things, corrected the errors in the German language in my treatise. Plouquet and Reuss, who has written *Disp. universale*[82], are also in Tüb., but I did not visit them as the former is mostly occupied with practical medicine, and the latter is said to be of very little worth and has no audience here. His family is said to come from Denmark. His father is said to have been Chancellor in Holstein (a clergyman as far as I understand).

The 30th. In Stuttgart. The theatre here is quite good. This evening I saw Kotzebue's *Armuth und Edelsinn*[83], in which a Mlle Bulla performed so well that I almost forgot it was a play. Osiander has recently arrived from Bamberg, and I visited him today.

Novemb.

The 1st. I have been unwell for some days, so today, on Jäger's advice, I took some medicine that has done me some good. On the 2nd I journeyed to Karlsruhe in the company of a merchant from

81. Literally, formative urge.

82. *Dispensatorium Universale seu Lexicon Chemico-Pharmaceuticum* (1791).

83. *Poverty and Generosity* (1795), a comedy.

Frankfurt, Rosallino. We arrived the very evening when a princess of Baaden was to be married to a prince of Brunswig. Therefore we could not find rooms at the inn we wanted and had to be satisfied with one room for the two of us at another, called *zum Rappen*. This happens so frequently when 2 people travel together that I am inclined to believe that it is the policy of the innkeepers, when they only have a few free rooms, to force 2 people travelling together to be satisfied with one.

On the 3rd, I went to Professor Böckman, who received me very amicably as soon as he heard my name. He showed me the princely collection of physical instruments, of which he is in charge, among others the instruments with which he has conducted his strange experiments. He has kept these, as well as the results of his experiments, with much care and elegance. In the afternoon he took me to see Court Councillor Gmelin, who is in charge of the natural history collection and the botanical gardens. He showed me both and also introduced me to his family, with whom I watched a fireworks display that was held at the castle on the occasion of the nuptials. The authors were – a chimney sweep and a footman, and the work matched the authors.

On the 4th Böckmann took me to the reading room here, where I found the latest journals. In the afternoon I visited the library, where I did not find what I was looking for but met very courteous librarians.

On the 5th, Gmelin again took me to the natural history collection, where an extremely beautiful girl arrived shortly after, accompanied by an elderly lady. Gmelin introduced me to her. It was the youngest princess of Baden[84]. I took leave of Böckmann today and got from him a letter of introduction to a Pastor Petersen in Strassburg, who devotes much time to physics. Finally, I was also in the workshop of a lapidary Meyer, from whom I purchased 5 pieces of beautiful minerals for 1 ½ guilders. As he makes most of it into works of art, many pieces come off which are useful for collections, and he sells these at a good price. He is also willing to send minerals

84. Wilhelmine Louise, Princess of Baden (1788-1836), youngest daughter of Karl Ludwig of Baden and Amalia of Hessen-Darmstadt.

from the region to me in Copenhagen, in return for those from Iceland, especially zeolites. He will deliver a hundredweight of his to Hamburg for 12 guilders in freight.

The 6th. The journey to Strassburg in the company of a merchant Hemmert, who lived there, and the wife of a shoemaker, who was quite cultivated for her class. In the evening at the playhouse.

The 7th at Pastor Petersen's. Our conversation began thus: "I bring you a letter from your friend Professor Böckmann and am very pleased, on this occasion, to be able to make the acquaintance of a man who occupies himself with physics with such eagerness and success." – "You are welcome as you bring a letter from so dear a friend; where did you study?" – "In Copenhagen, I am Danish." – "You are doubly welcome, we are half compatriots, my father was born on Als. And your name?" – "Ørsted." – "Presumably, then, related to the Ørsted who has concerned himself with galvanism?" – "That is me." – "Then you are all the more welcome to me, I have a battery after your idea." We now continued our conversation on physics and chemistry and spent a couple of pleasant hours.

My next letter from Paris. In order to save postage I shall henceforth write as small as here.[85]
Din
Christian

To Professor Manthey:

December 6th 1802

I have been in Paris for too short a time to be able to write you anything of interest, and I have not wished to visit scholars until I had your letters of introduction in hand.

I only take the liberty of commenting on my plan for borrowing money. My brother writes to me that it does not seem to be advantageous for me to take a loan because it will be difficult for me to repay it if I obtain only a small salary. I think that this should not be

85. Ø's economy lasts until the end of March 1803. During this period each page contains approximately twice as many lines as usual, which makes the letters difficult to read.

taken into consideration as it would be impossible for me to pursue my science properly without a collection of instruments, and furthermore I cannot see myself in any position to earn something by lecturing if I cannot perform sufficiently many experiments. And in the normal course of events, giving lectures on experimental physics should enable me to earn more than I must repay each year. I also think that Moldenhawer would not be interested in seeing money go out of the university accounts that he might have used in other ways, but I do not think it certain that he can prevent it. I accept with gratitude your kind offer to arrange a loan for me from other sources if this should fail, which I, like you, do not regard as certain. Naturally, it is important for me to have instruments in hand as soon as I come home or shortly thereafter.

I eagerly await your comments regarding my chemical letter.

Many regards from numerous acquaintances in Paris. Everywhere you are spoken of with well-deserved respect here, which pleases me greatly.
Your devoted friend
Ørsted.

Continuation of the travel journal:

Paris, December 1802

It is impossible to examine all the things that one finds here in Paris closely the first time one sees them and even more impossible to pronounce judgement on them immediately. Therefore our entertainment would be entirely too tumultuous if I tried to maintain the usual diary form of my letters. I shall have to be content with making brief notes every evening of what I have seen and try to concentrate here on the things which I have investigated repeatedly regarding important men and things under separate headings.

Athenaeum[86]. This is an institution for scientific gatherings. There are several of these, but what characterizes them all is that the

86. *Athénée de Paris* (1792-1853) was a private institution (with various names) for the propagation of natural science in the forms of teaching, public lectures, publications, and research.

members, among whom there are ladies, too, have free entrance at all hours of the day to a collection of the latest journals and a small choice library etc. In the evenings there are popular lectures on various sciences, including physics, chemistry, philosophy, Italian, English, and the like. I have become a member of one of these societies which distinguishes itself favourably from the others. Fourcroy lectures on chemistry, Le Fevre Gineau on physics, Hatzenfratz on technology, Boldoni on Italian. I listen to the first and the last of these, but I shall reserve my judgement for another time. One evening each week there is what they call a *séance litéraire*, where now passages from a famous writer are read, now there are reports of news from the scholarly world. The society has a larger collection of physical instruments than could be expected. Entrance to this society is very expensive, it costs 4 *Louisd'or*, which gives membership rights for one year.

Old acquaintances renewed. (You must not expect any particular kind of order in the sequence of the headings; I follow my whims and cannot possibly do otherwise.) You already know that I have found Heyberg and Gjerlev again. I have also found Baggesen, who was very glad to see me. He lives quite well, and there is a certain neatness about his lodgings. Above all, he owns some beautiful paintings. His wife[87] draws excellently, and I saw several of her works there. At the moment he is working on a Danish translation of Homer and of a German epic poem, but not about Buonaparte, whom he now hates. Although he is very interesting to be with, it strikes me that he can no longer be the person he once was, at least a satire on Voss' potato song[88] which he read was not nearly so powerful as his older works. I already noticed the same thing in something he read to my brother and me in Copenhagen about Fichte. – I have also met F. Schlegel again. He is here primarily to study but also counts on being appointed by one of the *Lycées* which are being established. He lectures here on German literature, but in German. He has given me a ticket to his lectures, and I use it since he only lectures every Sunday morning and most interestingly, as

87. Fanny Reybaz (1775-1822), daughter of a clergyman in Genf.

88. Poem: Die Kartoffelernte (The Potato Harvest) (1794) by Johann Heinrich Voss.

far as I can conclude from the single time I was there. I have also found Suell again; he lives in the same house as I do.

New acquaintances have not yet been an object for me, but several have presented themselves. There are several of my countrymen here, but none of them are worth mentioning except for historical accuracy. Juul, a boy of noble birth, is particularly ignorant, Lilienkrone, Baron and officer but nothing more, a Captain Seuften, quite cultivated for a capt., a Capt. Hafner, who appears to be a good man, Capt. (or rather Master) Arktander, who may be a good sailor, a certain Mörk, whom I have only met once, similarly one Björnerud, a certain Hasler, who is studying chemistry here but could have learned something, I will not say **something more**, at home first. A countryman Lehmann from Holstein, who studies natural science and philology and is working on an annotated edition of Pliny, seems to belong to a much better class of people. I have twice been to visit Görrike, the legation chaplain, and will visit him more often. I regard him as a good acquaintance, which Prof. Manthey has procured for me. Of scholars, I have made the acquaintance of Millin, who is responsible for the antiquities and some of the books in the National Library. He knows German literature and is very obliging to visitors. I had the pleasure of hearing him explain the inscribed stones and other antiquities to a party. There is a rather rich and beautiful collection of such things although it does not strike me as exceptional. Every Wednesday evening, Millin's house is open to practitioners of science and often brings the most interesting men together. There are a great many German and French journals and other new books for inspection. This and the company are all there is; one is offered neither food nor drink at such parties in Paris as elsewhere. Winkler, a German, is Millin's assistant. I had a letter of introduction to him from Oberlin in Strassburg; so far I have only spoken with him a few times.

Lectures. Vauquelin delivers a series of private lectures on chemistry, for which he demands 144 livres from each, and has more than 40 students at the moment. He lectures every other day for over 2 hours, but how long is uncertain so that it is not possible to decide to attend any lecture which is given immediately after his. I have decided to attend his lectures for the sake of the beautiful experi-

ments, from which I really learn much. Otherwise, his lectures are incomprehensible not only because of his weak voice and great speed, but they are also as messy and unscientific as can be imagined. I can find no order in them other than that of the free association of ideas. In order to give an example I merely mention that one day he lectured on heat, then on combustion, the following day on the mechanical properties of air, on evaporation in rarefied air, and on stones which have fallen from the sky. I know of no-one who surpasses him in poetic order except Prof. B. in Cph. But to return to his virtues, neither do I know of anyone who surpasses him in the performance of experiments with lightness and precision. He is to a proper chemist as a good prosector is to an anatomist, which is quite good; if only we had many such reliable prosectors. He has four attendants in his laboratory so that the experiments do not require as much time as usual. The laboratory is well and tastefully arranged. A large chimney with the necessary ovens and a table with a mercury apparatus at one end and a water apparatus at the other for gases. The cupboards for reagents have glass doors through which one can see that everything stands with the greatest cleanliness and order. The listeners sit in an amphitheatre opposite the chimney and the lectern so that everything can be seen perfectly in the light that falls through the glass ceiling which covers the working area but not the listeners' so that everything is illuminated appropriately. There are no windows. There is a medallion on the wall with the names of the foremost chemists, quite properly including foreigners. – Fourcroy lectures at the Athenaeum, where I have heard him only once so far as he alternates with Thenard, whom I have not yet had the time to hear. Fourcroy undeniably lectures well but not quite up to my expectations. I think he can be compared to our Bugge, whose lectures are really just as beautiful and just as – superficial. The evening I heard Fourcroy was devoted to an introduction to chemistry, in which he attempted to show that the old chemists knew nothing about chemistry and wanted to convince us that now we know everything. It is certain that it is easier to reject than to understand our predecessors, and that one can do nothing but resort to the former when one's insight does not extend beyond the limits of antiphlogistic chemistry. It is very easy to be just to the

old as well as the new. The art of experimentation belongs to the new, but the ability to draw great conclusions from a few observations, or to peer into nature with a prophetic spirit, was something that the old chemists had in a measure which is perhaps greater than the newer want to believe. The future may teach them that Pythagoras' numbers and Thales' water have greater significance than all their elegantly proved but far more limited theories. Only when the art of experimentation can lead us consciously to where the poetic spirit led the old chemists unconsciously will we learn to assess them correctly. The old chemists understood nature by agreement with it, sympathy; we understand it only by fighting against it, antipathy, I would say about most people, but more imperfectly even though we know it better. – I heard Charles lecture on electricity and was greatly pleased. His delivery is lively and interesting, his experiments are beautiful and numerous. He will soon start a complete course of physics, which I will attend. F. Schlegel lectures on[89]

Theatres. Paris has some twenty theatres at the moment; so it will hardly surprise you that I do not yet know them all. Best of all here is the **Opera**, and that not so much for the sake of the singing and the acting as for the machinery and particularly the dancing. I have seen two ballets there, *Hero and Leander*[90] and *Psiche*[91]. The grace which the artists know how to impart to their movements, the infinite gliding lightness with which they hurry by, are hardly equalled in any other theatre. It is well known that Vestris is the finest of them all, and his son, who is still a child, is extraordinarily accomplished. The machinery here is often enchanting, too; the curtain is not lowered between the acts, but all changes occur right before the eyes of the audience although so rapidly that you hardly see them. Gods move between heaven and earth seemingly without a wire or the like; a majestic cloud hides all the profane from the eyes of the audience. When I saw *The Judgement of Paris* in München[92], I could

89. This sentence is incomplete and has been deleted.

90. *Héro et Leandre* (1799), composed by Joseph Lefebvre (1761-?) with choreography by Louis Jacques Jessé Milon (1766-1845).

91. *Psyché* (1790), a ballet in 3 acts, composed by Ernst Louis Muller (1740-1811) with choreography by Pierre Gabriel Gardel (1758-1840).

92. See p. 130.

not decide whether one of the characters had been hanged (by mistake) or taken up to Heaven. *Theatre français* is in second place. I saw there *Oedipus*[93], *Rodogune*[94] and *Venceslaus*[95], an old tragedy from before Corneille's time, the only one which has been preserved from that era but perhaps the most powerful of all French tragedies. I find one of the actors here to be quite exceptional; he is **Talma**, Stochflet's brother-in-law[96]. He has power and nature, and he is free of the exaggeration which characterizes almost all of the other French actors. Moreover, he has a roundness and completeness in his acting which clearly places him among the masters. He has a noble figure, and his voice is beautiful. In spite of his natural style and the fact that he is free of all bombast, he is much applauded by the French. The others all have more or less talent, but only T. is free of bombast, and one can have the French audiences say, like Grethe in *Kjærlighed uden Strømper*[97]:

– – – – – "tænk hvor min Beundring steeg
Og steeg des høyere, jo mere Du bistert skreeg."[98]

This is quite literally true. It is my deepest conviction that artists must transcend ordinary nature, and that the performances of the theatre, like all works of art, should aim for a higher, ideal nature, but art has its limits in beauty, and every forceful statement which exceeds these is unworthy of art. The French seem to have no sense of this; the artist can pose as monstrously as he likes; if he only has expressions, people are quite satisfied.

Faideau is a theatre of lower quality but of a sort where the French show themselves to greater advantage, that is, in everyday comedy

93. Tragedy (1659) by Pierre Corneille.

94. Tragedy (1644) by Corneille.

95. Tragedy (1647) by Jean Rotrou (1609-50).

96. Henrik Stockfleth was engaged to Talma's sister, Euphrosyne, but he broke the engagement and in 1804 married Marie Louise v. Staffeldt, sister of the poet Schack von Staffeldt.

97. *Love without Stockings* (1772), a comedy by Johan Herman Wessel.

98. "Think how my admiration swelled/And swelled still more the more you fiercely yelled."

and naivité. I have seen *The Little Savoyards*[99] and a few other small pieces played excellently here. No more details for now. Perhaps another time.

Lodgings. I had nearly forgotten this important part of my existence. I have 2 rooms here, one is 12 feet long and 6 wide, the other is half as big and is my bedroom. I pay 36 livres per month, which is somewhat less than 9 Rd. I could have a larger place at a better price, but this is in the centre of Paris, and it often saves me a lot of time. The house is called *Hôtel de philadelphie* and is in the *passage des petits pères*. I am not telling you this in order to have my letters sent there as I might decide to move, but I ask that they continue to be sent to Görrike.

The daily routine here is that most people get up at 9 or 10 o'clock, leave the house at 12, eat dinner at 4, then go to a coffeehouse and from there to the theatre, and bedtime is between 12 and 2. These days, I rise somewhat before 8, when my language teacher comes. He drinks tea with me and stays 1 ½, often 2, hours. I pay him 2 livres per day. He is very competent, and he and others assure me that I have already made progress in the fortnight I have been here. I regard it as useful and necessary to have a language teacher although I could manage to express myself in French; for it is neither economical nor useful to use the scholars whose company I seek as language masters. It creates an uncomfortable constraint when one is unable to express oneself to them with a certain elegance. By 10 o'clock my language teacher has left me, and I have now got as far as, or if you will a little farther than, those who get up then. Often I go out immediately; often I stay at home for some hours as not all my work can be finished in the evening. At 12 noon every other day I go to Vauquelin and to Charles on the other days. I never leave Vauquelin before 3 o'clock and often later. I spend the time until 4 o'clock, when one eats, in various ways as the day demands. I have finished eating by 5 o'clock. After my meal so far I have usually gone to *Kaffé de mille Colonnes* and from there either to the theatre or to the Athenaeum, but I shall soon make changes in that respect. In the evening, Suell, Gjerlev and I get together to give

99. *Les deux petits savoyards* (1789), a comic opera by Nicolas Dalayrac (1753-1809).

each other the day's report. Afterwards I read or write often until 2 o'clock. Thus the days pass, and I feel every day that I have accomplished too little. However, I have really seen a lot, but many things must be seen more often.

Museum, a collection of antiquities and paintings which I think is unequalled in the whole world. I have only seen it 3 times so far, and I can only state my admiration. I shall provide details little by little. Here only some generalities and a few specifics. The museum is at the Louvre and has a lot of space there. The antiquities are on the lowest floor, and one ascends a staircase to the paintings. I have not yet discovered the system according to which the antiquities have been arranged, but the paintings are arranged according to their school. Several of the latest works by contemporary masters were on display when I came here and were later taken down to decorate the Consul's palace. Among these a painting by Guerin, a young man of 26, has attracted much attention. It depicts Theseus, whose wife was in love with his son, her stepson, and when she discovered that her love was not returned, she accused him of trying to seduce her. The French, or rather some of them, claim that his artistic expression surpasses all that has been seen so far. It really is quite beautiful, but it cannot compare with one of the works of the older Italian masters. One can apply to him what a connoisseur has said of the French masters in general: They have studied man and nature in the theatre, and I emphasize in the theatre rather than in reality. As a result, they paint purely theatrical scenes. In this work there is a confidante behind the princess's chair. A most necessary thing in the French theatre. I should note that the painter has given his composition a unity and a simplicity rarely seen in a French painter. Theseus sits at his wife's side, embracing her with one arm as though he wants to comfort her for the affront, and extending the other arm in accusation towards his son, a young hunter who has just returned from the hunt and stands before his parents filled with the knowledge of his innocence. Fear and remorse are clearly painted in the stepmother's face. I find the colours repulsive. A picture of a holy woman by a Madame Le Brun was the most beautiful of all on display this time. Among the antiquities, I have only studied the Apollo of Belvedere and Laocoon carefully. All description is useless;

one can only feel and enjoy these masterpieces by seeing them. Buonaparte has had the heroic idea of establishing a prize for the artist who can produce the best arm for Laocoon (one arm is missing). One sees that the French still have the unfortunate idea of tinkering with masterpieces. I find it little better than offering a prize for the completion of old tragedies of which we possess only fragments. Buonaparte may be a good generalissimus, but he has no understanding of art. To be continued.
Your
Christian

I had decided to write more about the museum, but I find it to be much too soon. I want to visit it more often and then write one long letter about that alone. I go there often but not for long each time, and I am becoming quite familiar with it. I already knew the works of the most famous masters due to what I had seen in Germany, but here I have now had the opportunity to study many of the works more carefully though I do not spend enough time on it to become a connoisseur. I would rather address myself to something that I have studied more carefully, that is, the lectures here in physics and chemistry. I have already spoken about Vauquelin's and said a few words about Charles', but I do not think it amiss to write more fully about them as a reminder of the manner in which I have used and looked upon them.

Although nature has endowed Charles with everything needed to be a good teacher, he also owes much to his diligence. He has written every lecture virtually *in extenso* and often reads directly from his text when a coherent and detailed argument is called for, yet he knows how to do this so that one does not feel that it is being read. I find this technique to be extremely good because it provides a guaranty to those who are not disposed towards speaking in public for the order and the arguments they have planned. Vauquelin arrives, if not completely unprepared, yet ill-prepared and makes an even worse impression because nature has denied him what it gave Charles. He is a well formed man with a pure and open face, whose somewhat bald head does not disfigure him; Vauquelin looks like a tailor, as Professor Manthey has already

remarked. Charles has a beautiful voice and a fluent tongue; V. has a weak voice, is often at a loss for words and talks terribly rapidly. Charles is always careful with his appearance and cuts quite a different figure in his brown silk coat than V. in his old greatcoat. (Naturally, I mention this unimportant matter only for the sake of the contrast.) Charles has prepared every experiment so that his listeners see precisely what they should see, neither more nor less. If, for example, Charles wants to weigh something, it has already been weighed, and he immediately finds the balance which another would spend a long time seeking. (This is just one example among hundreds.) V. either has not prepared his experiments and now and again performs them clumsily, or he has prepared so much that the poor listener sees nothing and is treated rather like the man who commissioned a painting of the Israelites crossing the Red Sea, but the artist painted the Red Sea and said that the Israelites had already crossed. To give one example among many possible, I will merely mention that one day, when he wanted to show that burnt coal absorbs air, he showed a bell jar, sealed with mercury, that was half full of air and had some coals in it. He said that there had previously been so much air that it filled the jar, but that the coals had been placed in it yesterday, and now everyone could see how much it had absorbed. Have the spectators actually seen this experiment? Should they not at least have seen the beginning and the end if this absorption took such a long time? However, I know from personal experience that it goes more quickly, and that a quantity of carbonic acid gas is absorbed in a few minutes. Vauquelin permits his students to perform many of the experiments, and most often he does only the simplest himself, e.g. mixing two things with one another and the like; Charles always takes the leading part in his experiments, and one sees his assistants as mere servants. This is most advantageous for the attention, which is necessarily divided when another speaks during the experiment. Charles always knows how to place his experiments in the necessary light so that it is difficult to find a spectator who does not see it. V. often performs the most important distillations, gas generations, etc. in a dark chimney and says very little about them so that I dare claim that there are many experiments

about which the majority of his listeners know nothing. Charles' entire lecture is a systematic and well-chosen series of experiments, and what he says is but the verbal expression of what the audience have seen. Vauquelin's lecture is an unsystematic collection of sentences, illuminated by a few incomplete experiments. V. economizes with both his talent and his money in his lectures, for he performs no expensive experiments and none that require particular skill for the estimated 400 *Louis d'or* that one can assume he collects for a course of lectures of only 4 months' duration, and one sees no important instruments with him. He has, for example, not demonstrated the combustion of phosphorus, iron or sulphur in oxygen gas so that complete absorption can be shown, but he did tell how this could be done, and how the glass bell needed for this had to be made to prevent it from breaking. He did not have this simple thing, which he could have had made from a large glass tube for a few livres. Little more was needed than a small glass bell with a thin, round top, filled with mercury, in which he could melt phosphorus and then let the oxygen gas rise in small vesicles. "If I had such a thing," he said very naively, "I would be delighted to show you the experiment." So far, Charles has not failed to show us a single necessary experiment. However, I will certainly not deny that it is rather more difficult to lecture on chemistry than on physics. Still, Vauquelin's lectures, even when they were as good as other sensible people's, have led me to many observations about technical improvements, which I have not failed to write down. Besides, during the lectures I always write down things that I find remarkable in the procedure or errors which should be avoided, or if something should strike me as new. Neither do I fail to note where well-known theorems could lead to new applications both in the sciences and in the arts and write it down.

Fourcroy's art lies in generalization. His lectures contain no isolated fact, nothing that lacks interest, either theoretically, due to his perspicacity, or practically, due to their broad applications. He knows how to make even the driest things interesting to the uninitiated, at least by telling how people previously had erroneous or ridiculous notions, and how the French have improved all this. F. has

a perfect grasp of how to lecture amateurs and knows how to make something understandable without forcing people to immerse themselves in it. But it is unpleasant to hear him denigrate the old chemists without knowing them properly so that he almost always gives a distorted view of them.

In addition to the lectures which I spoke of in my last letter, I am also listening to Dumeril, who lectures once a week on natural history according to Cuvier's system. Though these lectures can only touch the surface, they still give me the benefit of becoming acquainted with this new system. I cannot go directly to the source as Cuvier is travelling in the provinces on a commission for the school authorities. Since the lectures are held at the Athenaeum, they cost me nothing and do not waste much of my time as I live nearby. I benefit enormously from the Athenaeum as almost everything that Paris has of literary interest is reported there. Some days ago I was present at an exercise that Sicard carried out with his deaf-mutes. If I had not had the opportunity to become acquainted with it here, I would have had first to go and get a ticket and then walk to the other end of the city at some inopportune time. Sicard has begun to teach some of them to speak, which only one of them could do properly. He asked one of his listeners to find a verse in a little book he had with him and had one of the deaf-mutes dictate it to another, then had a third read it in signs and a fourth read it aloud. I shall not repeat here what many others have said before, I shall only mention that this was nothing novel for me as I had already seen so much like it in Leipzig and Berlin, and I was already familiar with the important features of the present institution from the reports of others. It puzzles me why they make such an effort to teach them to express all their ideas in mime; sign language, in which there is a sign for every letter from which words can be constructed just as in writing, strikes me as both more convenient and more complete. I cannot understand why such a simple means has been ignored, but I will try to find out when the opportunity arises. I find it quite understandable that a mimetic sign language can be necessary for them in daily life when they come into contact with others, and I do not deny that these highly graphic signs can serve to develop many concepts for these unfortunates, but I find that

the attempt to express God, soul, immortality, eternity, time etc. with pure mimicry easily degenerates into childishness. – The inventor of pasigraphy was at another literary séance at the Athenaeum and explained the basic principles of his pasigraphy and pasilaly[100]. Of course, it is not possible to judge such a matter with certainty after only an hour or two, but I do not think I claim too much in saying that this art is still in its infancy, and all sensible people will certainly applaud me when I say that the inventor presented his ideas with a childish, although sometimes accurate, wit. I find it odd that he uses twelve signs in his system, each of which he divides into 4 classes, just as Kant does his twelve categories, and these classes really have a slight resemblance to those although the separate signs do not correspond to the categories but are far more individual. These signs are all intended for physical objects or at least derived from them. It is not possible to derive non-physical notions, e.g. thoughts, perspicacity etc., from these naturally. Otherwise, he has a keen eye, and his signs often point out deficiencies in language. He thus showed that the French word *aimable* has two meanings, one analogous with *calculable*, which expresses the possibility that something can be loved; we would have to create the word **elskbar**[101], which would be rather harsh. The other meaning was obviously the same as our Danish **elskværdig**[102]. His sign language does not confuse two such ideas. He assumes that every adjective can have 7 modifications, corresponding to the 7 rays into which light can be split, a comparison which he does not regard as infallible though he does not think that it should be given up. – Delile has read some of his own poems on several occasions. He knows them almost by heart, which is necessary as he is almost blind. He has a prompter for what he does not remember. His reading was excellent the first time, so that it was a pleasure to hear his poems, which in themselves are little more than versified sermons or speeches. On another occasion he did not read so well and did not remember what he wanted to say. Thus, this society is richly

100. pasigraphy = universal written language; pasilaly = universal spoken language.
101. loveable
102. amiable

entertaining and educational and can be recommended to anyone who intends to visit Paris.

I have had the opportunity to hear another kind of lecture from Haüy. He lectured 6 or 7 times to a small group on the characteristics of his crystallographic system. It was more by way of friendly entertainment than a lecture, and the noble simplicity and good nature which envelop his every word and action must make him universally well liked. One seldom finds anyone so free of pretensions in Paris. He remembers Professor Manthey with well-deserved respect.

As I spoke of the theatres in my previous letters, I should not forget here that I have since seen several of the smaller ones in order to become familiar with them. These are: *Théatre Montensier* (known for being the principal haunt of prostitutes who belong to neither the best nor the worst class), the Italian opera, also called the *Opera buffa*, where one usually hears wonderful singing, the vaudeville theatre, to which the spectators are enticed by the most peculiar kind of French theatre, based on current events, in a mixture of song and speech accompanied by light, often pleasing but rarely forceful, music. *Théatre Louvois*, which really depicts Paris morals, and where the playwright and actor Picard plays the principal role. He generally receives much applause, but when it is deemed appropriate, there are also catcalls for one of the many products of his imagination. I intend to visit the last three of these theatres, particularly the *Louvois*, more often.

I have just remembered that I have also been at the National Institute several times. I once attended the moral and political section, introduced by Gregoire, and I have been to the physical class a couple of times without anything of importance happening. The listeners are poorly placed and do not hear well. At the moment Paris lacks scientific news as all the scholars are too busy or too well paid to work; they do nothing but financial operations in order to become richer than they are, instead of just working for their daily bread as before. They now work for honour at court instead of seeking it in science as before. The only consolation here is that Berthollet will soon finish his chemical statistics, a work which is certain to introduce a new era.

I have also been in the *société philomatique*[103] – Lasteyrie introduced me there; this society almost promises to be of greater interest than the National Institute. There was, however, nothing of particular significance the evening I was there.

Once every decade[104] Lasteyrie entertains, but when I was there, the company was not very numerous and consisted mostly of good republicans who said a great deal that is regarded here as quite free but would be regarded as quite common at home; I have often heard far bolder things said at Dreyer's Club than they would dare to say at a private party in a so-called republic.

Another gathering which interests me considerably is at Schlegel's. Every Sunday evening he assembles a German party, and the talk is always of philosophical, physical or æsthetic matters. A famous poem or the like is often read. Thus Schlegel recently read Tieck's *gestiefelter Kater*[105], in which he imitated the voices of all of the characters, e.g. Fessler, Fisher etc., which made the whole thing very distinctive. NB. Nothing except these men's literary character is being attacked there. At these gatherings I have become acquainted with several Germans, most of whom will only be mentioned here. A painter Jagemann, another painter Lombard, a Swiss, a Mrs. von Aswerd, a Consistorial Councillor Horstig and his wife from Kassel, Schweighäuser, son of the philologist from Strassburg, Thiriot, a musician, Meyer, a chemist. Froeriep also comes, and on this occasion I have renewed my acquaintance with him. I often see Baggesen here. He is keen to learn physics and attends Charles' lectures. He often has quite marvelous ideas in this regard. He has written me a letter about *Naturphilosophie*, in which there are a great many beautiful suggestions. Poetic genius is good for everything; if it could be united with the appropriate temperament of patience and penetration, it would accomplish more than 100 Vauquelins. Regarding Charles, Baggesen is extremely diligent and has not missed a single lecture.

103. *La Société philomathique de Paris*, a society for lovers of science, was founded in 1788 by Augustin François Silvestre (1762-1851) and Alexandre Brongniart.

104. A period of ten days substituted for the week in the French Republican calendar of 1793.

105. *Der gestiefelte Kater* (*Puss-in-Boots*) (1797), a comedy.

Daubisson, the author of Description des mines de Freyberg[106], is among the old acquaintances that I have renewed here. I met him in Freyberg.
More within a fortnight.
Your
Christian.

To Professor Manthey:

Paris, January 1803

I send you my warmest thanks for the letters of introduction sent to me. You have done me a particular service by procuring Lasteyrie's acquaintance for me, and he would be even more important to me if he were not on the point of leaving for Spain, where he intends to remain longer than I in Paris. However, he does everything for me that his limited time allows and regrets that he cannot do more. Vauquelin has been quite courteous, but every day I lose more of my preconceived respect for him. I have recently learned from one of my acquaintances, a reliable person who works in Vauquelin's laboratory, how much he currently presses or rather rushes his work with the result that I no longer think the same about him as I did before in that regard. Today his assistant showed me water from which V. had filtered precipitates, and in which an additional few percent of salt had been deposited from the earths contained in the minerals. He thus explained why V. always has a few percent loss in every analysis, e.g. 12 percent in that of gadolinite. I notice, too, that he leaves all the work to this assistant, who certainly merits confidence, but V. cannot honestly present as his work what another does with his materials but virtually without his help. At present Thenard is somewhat ill, but I shall visit him as soon as he recovers. It is, I hope, much easier to become acquainted with the younger than with the older scholars in this now so aristocratic Paris. My experience does permit me to say that it is much easier to rouse interest, merely as a practitioner of science, in the scholars of northern Germany than here. However, I hope that

106. *Des mines de Freiberg en Saxe et de leur exploitation* (1802).

this will become easier the more I acquire skill in the language of the country.

I am sorry that I forgot to send you the receipt for Cappel's grant. I do not remember the payment dates while travelling. It is also really childish spitefulness on Jürgensen's part that he will not pay the grant using the general power of attorney that you have. I enclose the receipt as well as a summary of my travels, from which Mr. J. can see what I have accomplished, and why I prefer not to send documentation of my diligence.

The following are the amounts which I have received on your account during my journey:

From Ratsch and Boitels in Naumb.	25 *Louis d'or*
From Hermstädt	20 ditto
From Gebrüdern Schickler in Berlin	30 ditto in January 1802
And ditto	40 ditto in May 1802
From Speidel in Leipzig	40 ditto
Sum total	155 *Louis d'or*

From Cornill in Frankfurt 400 *Keisergylden*, which is about 44 *Louis d'or*. Upon my arrival I received 1200 livres from Görrike and shall receive another 1500 soon. That I spend so much money at the beginning here is due to the significant initial expenses in this new world. I had not purchased more than the most necessary clothing with the intention of equipping myself here. This led to an immediate expenditure of one hundred fifty livres. I have paid 144 livres for Vauquelin's lectures, 96 livres for Charles' and an equal amount to join the Athenaeum. It has also been necessary to buy some of the most recent chemical and physical books, and they have cost me about 200 livres although I got them for less than the book-sellers' price. These are all expenses which will occur only once, and which I do not believe could have been avoided. I also believe that I have learned how to reduce the running expenses here so that they should not be so high in the future as before.

When I also speak of physical instruments in my letter regarding the loan for the chemical apparatus, it is only because I regard various physical instruments, such as an air pump, an electrical machine

etc., necessary for a chemist. For a complete physical apparatus 2000 Rd would hardly suffice. Besides, I do not fear that Steffens will take the profit away from me as he cannot perform experiments, and he lacks sufficient insight to lecture on experimental physics as it should be done. Bugge, on the other hand, will surely be a greater hindrance for me although he lacks much of the necessary knowledge. But I have three good reasons for my wish for reasonably good apparatus. First, there is no certain way for me to earn a living when I come home other than to give public and private instruction in chemistry, for which I shall require instruments. 2) It must be to my credit if I could declare in my plans for a chem. institute that I already had a collection of instruments which had been acquired with the support of the government just as it must be helpful for me to have no need to wait for these things. 3) My scientific activities must be suspended if I do not have unlimited opportunities to work when I come home.

Every day teaches me much about the art of giving lectures; how they should be given from Charles, and how they should not from Vauquelin. A rather precise exposition of my thoughts on this can be found in my journal. I see how much I have lacked in this art, or rather that I have not been aware of it at all; but when I have completed the schooling I have now begun, I hope to return the wiser. Vauquelin lectures in his own laboratory, which belongs to him and Fourcroy; it is quite new. Just inform me if you would like a sketch of it, as good as I can make it.

The excerpts of your papers which you offer me would be highly instructive and welcome. I shall be pleased to perform any service for you in Paris. I anticipate that I can only repay an infinitely small part of the debt which I owe you, but at least it pleases me to have the opportunity to show my gratitude. What you have written to me shall not be neglected.

It is easy to foresee that my journey will require a few hundred rix-dollars more than what the grant **will provide until my return**, but I have a simple solution for how I can get the remainder of the three-year sum from Cappel, even if Jürgensen raises objections. I shall tell you my thoughts on another occasion as I do not have time today for many more words. – Next time I shall also send you some

scientific news; if there were anything of particular importance here, I would not fail to write about it immediately.

I have fallen a bit behind in my letter-writing, which, among many others, also has the cause that circumstances no longer tie me to the clock. Since you as my friend take such an active interest in the use of my time, I owe you the assurance that the future will be more profitable and more structured. Then you will also see that I have not wasted my time here.
Your devoted
Ørsted.

To Professor Manthey:

Paris, March 6th 1803

I am quite astounded by my carelessness in failing to send you the receipt for Cappel's grant. It is enclosed here, and I ask for your forgiveness because you receive it so late.

I am greatly obliged for your reports on Parisian factories, artists, etc. I shall make use of them as soon as possible; I admit to you that I have never been any place where it has been more difficult for me to find my bearings than Paris. With a certain smooth complaisance everybody slips through my fingers before I can grasp them. Haüy is an excellent fellow, but he is one of those people who serve one personally rather than give instructions or introduce people or the like. Lasteirie would have been very useful to me if he were not to depart for Spain so soon. Vauquelin had promised to introduce me to Guyton and Berthollet at the National Institute; but something got in the way twice, and last time he forgot. For this reason I have not yet benefited from Paris as much as I should, but things are gradually getting better. I have profited greatly from the lectures, particularly Charles', which are infinitely instructive for me. I make notes of what I find remarkable in them as well as what I find to be errors that should be avoided. In addition, I read in some of the best books about the topics dealt with and compare them with the lectures. Very often, almost every day, new experiments which ought to be performed occur to me, and I also write these down carefully and hope to have a large fund of such material collected

when I come home. I feel that I have profited greatly here in Paris from this way of studying, and in this regard I am quite satisfied, but this is not the place to sit down and study; one has to see things, and I have not done this sufficiently, which has been due in part to my indisposition. Still, I hope that you will see from my journal that what I have busied myself with is worth the effort. Hereafter my letters will resume the form of a diary as I feel that is more certain.

If the opportunity which you mention in your last letter should be open for me, I would accept your recommendation with gratitude because circumstances are such that I cannot expect everything to be as I want it, and my position forbids me to reject an opportunity for a respectable livelihood. Here is my profession of faith. I see that it is a useful and worthy occupation to apply the sciences to everyday life; but with all the pains I have taken towards this end, I find that I am not well-suited for it. I have indeed formed an idea of various kinds of manufacture, especially that of porcelain; but I was far too ignorant of methods of production to develop this significantly on my journey as this was not my only purpose. I am confident that I can give lectures on technical chemistry when I come home, but if I were to lead a technical institute, I would have to spend all my time on it in order to fill my post as I should. I confess to you that this would not please me, for I have now begun the study of theoretical physics and chemistry, and the more I study, the more I see the necessity of continuing and the more I enjoy it, and I would be most reluctant to abandon the investigations which I have now decided to undertake. – Moreover, regarding the institute itself, it seems to me that one cannot expect much from one teacher. A single person cannot possibly teach everyone what he needs. To me, **mechanics** and **chemistry** are the basis of all technology, so I believe that a strictly technical school which would benefit the factories and industries of the country should consist of these two classes, in which one could both train students and give public lectures for artisans, if one regarded this as useful although it is my conviction that it is of little value. Those old brains are too inflexible, and what ideas remain are stopped by prejudice. In the **mechanical** class mathematics, mechanics and drawing should be taught;in the **chemical**; 1) the theory of chemistry and the art of

experimentation, 2) technical chemistry. According to this plan, one could not make do with fewer than 4 or 5 teachers, and the cost of this would surely cause alarm, but I insist that this would be the most useful. I am not satisfied with dry lectures alone, as they are given in Berlin, without the art of experimentation; for all scientific progress stems from experimentation. Some natural history, particularly mineralogy, would also be appropriate for such an institute. – Still, you know all of this better, so act for me so that I do not get a position that exceeds my powers; I will do everything I can to fulfil my duty in whatever position I get.
Your devoted
Ørsted.

Continuation of the travel journal:

Paris, March 1803

Most of the time since my last letter I have been ill with a cold, which was very common and dangerous here. It was what we had in Copenhagen 2 years ago under the name of "influenza", but it was treated here with much less wisdom. They let blood, they administered herbal teas and laxatives, and in short they did everything to send the patient to eternity, and this succeeded so well that the French said *il faut se mettre à la queue pour être enterré*[107]. I did somewhat better. I used camphor as in Copenhagen and thus was not affected so dangerously; however, I was poorly enough for a few days, and I had to exercise caution for some time as I am particularly susceptible to colds. Although the French doctors have recently sent a great many people to their graves and seem to recognize this themselves, in that they have now adopted a quite different cure for this disease, which here goes under the name of *la grippe*, the French doctors still believe that they are the best in the world, and the other Frenchmen doubt that there is any place on earth where the medical arts are more deeply understood. Laplace recently asked a Doctor Franck, the son of the famous doctor from Vienna, if they had as famous doctors in Vienna as in Paris. Franck

107. It is necessary to stand in line to be buried.

answered yes but added that they had taken a completely different way and had quite abandoned the method still used in France. "*Diable*," said Laplace, who was unable to recover from the shock this caused. The same arrogance is dominant here in all areas of knowledge, and it is thus unavoidable that the French will suffer serious reverses in the years to come. Previously, they were buoyed up by the enthusiasm with which they made discoveries themselves, but this era is apparently over, and there is nothing like the carelessness with which they treat foreign discoveries so that what they report is either half or entirely false. In the latest issue of Delametherie's *Journal*, in which he summarizes the discoveries of the past year, there is a discovery by Aldini in Italy, about which **Ritter** wrote a book more than 4 years ago. Even the most modest do not refrain from insulting foreign scholars, and I have more than once heard Vauquelin say that the German chemists have asserted this or that, accompanied by a mocking comment which he might have the right to make if it was merely Girtanner or Göttling or the like. I have another amusing example of a journalist who did not dare to publish an excerpt of a treatise in which the famous philologist Wolff showed that Cicero's speech *pro Marcello*[108] was not genuine because, the journalist said, the Academy had once and for all declared it to be genuine. Vauquelin has given me permission to work in the laboratory in the Mint, where he performs his analyses. It is my intention merely to repeat some of his analyses in order to learn his technique as there will obviously not be much time for more than that. Bergmann, a Swede who is related to the famous chemist of that name, also works there. We are friends and join in doing some work together which has not been assigned by Vauquelin. It consists in analysing some porcelain pigments, including some from the Dil factory, some secret powders that are sold here at high prices and the like. This gives me an opportunity to see all the chemical activities at the Mint; I have already been there once. Everything follows Vauquelin's *Manuel d'un essayeur*[109]. I may be able to use this opportunity to benefit my country. I have recently made

108. In defense of Marcellus.

109. *Manuel de l'essayeur* (1799).

the acquaintance of Thenard and heard him lecture at the Athenaeum, where he alternates with Fourcroy. He lectures quite well and more thoroughly than Fourcroy, who often makes the strangest mistakes from carelessness. Vauquelin has taken me several times to the National Institute, where Thenard and Seguin each recently read a treatise on fermentation; the latter promised a complete theory of beer fermentation, whereby he promised to reduce brewing completely to fundamental principles, but this time he gave only an introduction that contained some observations about yeast (*la levure*) and a summary of the problems he intended to solve. Vauquelin had promised to introduce me to Guyton and Berthollet, but he has repeatedly failed to do so, or there have been obstacles.

Our ambassador, Dreyer, has an odd preference for the nobility, whom he often invites to his home, and neglects ordinary people. He has invited me only once and that a couple of months after my arrival. Neergaar[d] was also there and Dr. Lehmann. We undoubtedly dined at his daily table as there was nothing spectacular about it. Gjerlev recently played a little trick on him. When he discovered that Dreyer did not intend to invite his countrymen for the King's birthday, he got all our countrymen to join in inviting Dreyer. He was much embarrassed by this, declared that it was really his duty, but that his cook was ill at the moment etc. He finally declined the invitation on the grounds that all such *réunions* were not politically advisable, whereupon those who were deputed to meet him responded that, if he thought it politically dangerous, they could only regard his advice as an order. There the matter ended, and some days later Dreyer again invited the nobility to his house. Baggesen, Gjerlev, Haffner (artillery captain) and I celebrated the King's birthday together and sang a song which Baggesen had written for the occasion.

The carnival here has been quite jolly. Shrove Sunday, Monday, Tuesday and Wednesday have been dedicated to it. Every busy street, the boulevards, the Palais Royal were filled with masks of every kind. I was just recovering from my cold at that time, but I was strong enough to walk around on Tuesday and look at the spectacle. An enormous number of all sorts of carriages were filled with

people in masquerade, a man dressed as a woman, a woman as a man, one as a negro, one as a jew, a monk, etc, but by far the most were dressed as harlequins. In the evening all the public houses were filled with masks, and in many places there were balls. One evening I visited 3 places with Gjerlew, Juul and Haffner. One of them was so full that it was impossible to breathe. It is no exaggeration to say that it was almost impossible to move about at this ball; we spent less than 10 minutes there. There was nothing of interest at the second ball, but the third was quite splendid. It was at the *Hameau de Gentillie*, which used to belong to one of the French princes. There were 9 rooms, all more crowded than desirable. Few women come to these public balls except prostitutes, but one finds that most of them there are as well-dressed as at the better balls at home. – It is said that Buonaparte has given a considerable sum for masks, with which the police have partly made the carnival more amusing and partly used the opportunity to make observations.

They make saltpetre out of old walls here. Anyone who pulls down a house is obliged to have the demolished walls inspected by a commissioner and let the saltpetre factories have them if they are suitable. I recently saw such a factory, which did not have much of interest to offer but was extremely simple. A Frenchman, a Norwegian named Klaussen and Bergmann came along. Klaussen asked me what that saltpetre could be used for. He is a merchant and has now made a journey through England and France!!!

I have forgotten to mention that I have had to find new lodgings. The landlord at the *Hotel de Philadelphia* was chased out as insolvent, he sold all his furniture, and we had to move out without proper notice. I now live, as does Gjerlev, in the *Grand Hotel de Versailles*, rue Batave, quite close to the Palais Royal. It costs me 6 livres more per month, but I live much better here and can keep all of my things in better order.

I now see my language teacher only twice a week. He praises me greatly for my French style, but I do not yet have the fluency that I wish I had even though I have made perceptible progress in this. And I do not actually embarrass myself when speaking. Even at the very beginning of my stay here I spoke with Haüy about several scientific subjects so that he understood me, and now it obviously goes better.

By chance, I have had the opportunity to visit a capable artist, Bre[g]uet, famous for his watches, which he has improved with important inventions. I went out with Gjerlev in order to visit Gregoire, and on the way home he proposed that I accompany him to the watchmaker as he wanted to buy a watch. I accepted, and we happened to go to this man, about whom I had heard nothing, but I saw some watches there whose mechanism was completely different from those of both ordinary and astronomical watches. I made inquiries and discovered their mechanism to be extremely ingenious, and I have since learned that he is the most famous watchmaker here and a member of the National Institute. He was most courteous to me and explained everything in great detail.

Among my acquaintances is also Friedländer, who publishes the journal for French literature on natural history etc., one of the most diminutive people I have seen. I had not imagined him to be so weak in knowledge in relation to the task he assumes, so conceited and yet so fawning, in short, so deficient of all sense of what gives the sciences value. He is a Jew and runs his scientific activities and relations in an entirely Jewish manner. Anyone who can bring him some scientific news, with which he can obtain other news from the French by barter, is welcome to him, and he is pleased to offer every possible service, that is, if he can do it without harming himself. He wanted to use me as his informant for Germany, but as I soon saw what the man was, I held back as I believe that I can report news to the French scholars better myself.

Here as everywhere it is often possible to set the entire town astir with the smallest thing. Recently, a man offered a prize, which consisted of some books, to the person who guessed the answer to a very complicated and difficult charade, and there came between 3 and 4000 answers, among which 60 were correct. They have made a kind of vaudeville about this event for the *Montensier*, which again sets a number of actors, audiences, theatre critics etc. in motion, and thus it goes on.

I must agree with praise for the Paris police; one hardly ever hears any disturbances here, but they rarely get involved in daily swindles and similar small matters and perhaps cannot. On the boulevards, they recently caught a coachman with a false number

that they had been watching for some time, and it is easy to find several similar examples.

Recently, I saw presentations by the same Pierre who was once in Copenhagen. They seemed to be somewhat improved and are quite beautiful. He does not seem to draw large audiences. I was there with several fellow countrymen and spoke Danish. This occasioned a Frenchman, who had been in Copenhagen for 30 years in Pechin's office, to speak to us. One thus finds people who speak our language more often than might be thought and cannot be too careful.

I shall conclude this letter with some scientific news which strikes me as interesting. One of the experiments that Coulomb mentions to prove that electricity is only transmitted on the surface of bodies has always struck me as paradoxical. When one electrifies the exterior of a hollow cylinder, the inner surface does not transmit any electricity to a small, well-isolated metal sphere as the outer surface does. It has always seemed to me that this experiment proves nothing since the inner surface of the cylinder is, in the literal sense of the word, just as much a surface as the outer, from which electricity can come without penetrating the body. Charles showed that this entire experiment proves nothing. He pointed out that such a small and isolated sphere has no place to deposit its opposite electricity as it is completely surrounded by the atmosphere. In order to prove the validity of this, he placed the same sphere inside a charged Leyden jar, where it did not receive even the slightest electricity, but a larger sphere or a sphere which was in communication with another by means of a lacquered metal wire received electricity equally well in both the cylinder and the jar. He did not deny that a hollow and a solid metal sphere of equal surface possess an equal capacity for electricity, and therefore this remains an interesting fact.

An observation, which is very simple but often overlooked, is that the elliptic form is the most inappropriate form for auditoriums, theatres and the like. Many have believed that they have done well to build their theatres etc. as ellipses, which most perfectly gather the sound at a point, but it is obvious that the majority receive too little and a few too much of the sound. This is the problem with the new theatre in Berlin.

If gold contains platina, it can be separated by amalgamating it with 3 times as much silver and then treating it with nitric acid, which then dissolves both the platina and the silver. I have not encountered this observation by Vauquelin anywhere else.
Your
Christian

March
The 11th. In Vauquelin's lecture and in the evening in the Philomathic Society, where someone read a paper on canals, which was only for mathematicians. I made the acquaintance of Biot, who wanted information about when the Royal Danish Academy was to award the prize for answers to the latest questions posed. He also wanted to know the date for submitting answers.

On the 12th I visited Thenard at the *école polytechnique*, where the students performed experimental exercises. I stayed there with Thenard and also met Desormes. I find the arrangement in that school, where the students have their own day for exercises and their own laboratories, worthy of imitation. There are 12 student laboratories here, and each is equipped with what is most necessary for the simpler experiments. Every lab. has a chimney in which there are several ovens with one student working at each of them. Thenard, on the other hand, has a laboratory equipped with all necessities for important experiments. I do not yet know whether there are more of these, whether Thenard is under Fourcroy's supervision etc. The students stay here for 2 years and are kept on for 3 or even 4 years as a sign of favour if they are very satisfactory. They must be at least 15 years old in order to be admitted and not more than 20. No-one is admitted without good knowledge in elementary mathematics. In Charles' lecture. As I alternate between Charles and Vauquelin every day, I shall not mention this again.

The 13th. As Vauquelin has so long failed to fulfil his promise to introduce me to Guyton and Berthollet, I went to the former today on my own. I received a most courteous reception, and he promised me a ticket to hear lectures at the polytechnic school, which I would like to do in order to gain a better understanding of this institution. I do not believe that such a ticket is strictly necessary. This evening

I became acquainted with **von Arnim** at Schlegel's. Although I did not have a high opinion of him, since I have been convinced that he has stolen the idea for his best treatise from Ritter, I still found him well beneath my expectations. I argued a good deal against him, though indirectly, by praising Ritter; he, on the other hand, attempted in a subtle way to denigrate this physicist, but I got him into difficulties every time. He seems to approach physics more as an amateur than as a naturalist; it is just that he is a speculative amateur while the others are empirical. A certain Meyer, who is also studying chemistry here, often visits Schlegel's, where I met him this evening, too, and spoke with him. Without betraying many talents, he seems to have a sound mind and be very friendly so that I can expect several small favours from him.

The 14th. Charles. Several time-wasting errands. Read the report of the Galvanic Society regarding galvanic discoveries. 3 doctors, members of the Society, had been charged with preparing it. There is hardly one genuine piece of news in it, many errors, and the most important things that have happened in Germany are not mentioned in it. The discovery about which Ritter has written his first treatise is attributed to Aldini as a discovery made last year. La Metherie has done the same in his journal.

On the 15th I visited Bouillon la Grange. He was polite, as all the French scholars are, but that was all. The instrument-maker Fortin lives in the same building, the *ecole centrale de pantheon*; I therefore also visited him and saw some quite interesting examples of his work. Another person, who looked like a beggar, offered to take me to the Galvanic Society, but I excused myself for want of time; this society is known to be wretched, and this member did not exactly recommend it. I then visited Liebes, who is professor of physics at the *ecole centrale* in Faubourg St. Antoine. I did not immediately find him at home, but I was told that he would come within the hour, so I walked around in this suburb, where I had not often been, and finally went into a coffee-house, where I met a creature who looked very much like a police spy. He talked very secretively to me about conditions in France and tried to lead me into a political discussion. I assured him that I did not understand much about politics and thus got rid of him. Liebes, who has written a new text-book in

physics, is already an ageing man, and he is not nearly as interesting as his wife, who must be a good deal younger. Otherwise, Liebes himself is undoubtedly a clever fellow; his book shows this, but his conversation is very phlegmatic. We talked mostly about galvanism, and when I had told him some news from Germany on this topic, he asked me if I had seen a galvanic battery. That's how incurable the French are in their conceit that nothing exists except in France! When I visited him, Guyton also asked me if I had seen a platina crucible. I answered yes, at the moment there are platina crucibles wherever there are chemists. After this wandering about I visited Friedländer, who gave me a short lecture on the history of the French educational system. The delivery and the structure were so good that it amazed me. In truth, I would not have believed that the little pusillanimous Friedländer had such a gift for description even if Gall's theory said so. We later saw the vaudeville *Fanchon la veilleuse*[110] together. The play is insignificant, but Madame Henri plays Fanchon so that one never tires of it.

The 16th. Only the usual business. In the evening at Gjerlev's in the company of Baggesen, Linstow, Juul and Tourné, a Frenchman who is married and lives in Copenhagen.

On the 17th I heard Berthollet in the *école polytechnique* for the first time. He lectures only once a week. He dealt with the caloric, about which he said very good things. In this school Fourcroy lectures on elementary chemistry, Berthollet on the practical or, more properly speaking, on the finer aspects of this science. He naturally presumes what Fourcroy has said and only resolves the difficulties which one generally does not think about. He speaks with difficulty and therefore quite slowly, which is actually well-suited to the profound ideas he presents. From Berthollet I went home with Meyer, who gave me several beautiful minerals. I went with him to the *école des mines*, where anyone with a desire to study mineralogy finds a true treasure. One finds there a collection arranged according to Werner, with the German names, another according to Haüy, a third according to Struve, a fourth according to the departments of France in

110. A comedy (1803) in 3 acts by Jean Nicolas Bouilly (1763-1842) and Joseph Pain (1773-1830).

which they are to be found, which is very convenient for those who want to make mineralogical trips in the country. I left there in time to hear Vauquelin. From there I went with Lehmann to the jardin des plantes. Lehmann is one of those people for whom my esteem grows every day. He has spent his time on natural history and technology and is inspired by an eagerness to serve his country with this knowledge although he could earn a living in other ways. He is from Holstein but possesses such an honest Danish patriotism that I must love him for that as well. We spent the rest of the day together and ended by visiting the *bal masqué* at the opera, where we had arranged to meet several countrymen. It is certainly a little more fun here than in Berlin but not much; however, I consider it my duty as a traveller to have seen it.

The 18th. Charles' lecture and other daily business. In the evening in the Philomathic Society, where a report which I had delivered regarding Ritter's experiments with light was read, not without applause.

On the 19th I was at the *école polytechnique* to hear Mongez. His gifts are not exactly the finest. He lectured on the physics of the general properties of bodies, very mathematical. They push mathematics excessively at this school, and chemistry only plays a secondary role although it is done well. This is undoubtedly appropriate for those who are to be educated as officers or highway supervisors etc. Guyton was supposed to begin one hour after Mongez had finished; Meyer and I therefore went for a walk on *Boulevard neuf*, but when we came back, it was too late. Today I went with Linstow to visit *cit.* Schmidt, who has invented an oven to warm rooms with air and to add moisture to this air, even aromatic steam if this is required. The invention is some years old, and I dare not say if it is really practical. In the evening I went to tea at Hasler's. Linstow, Juul, Gjerlev, Lehmann, Crohn were also there. Most of the time I discussed scientific subjects with Lehmann, who does not speak Danish. I grow more fond of him every day for his talents, knowledge and character. He is a good Danish patriot unlike most Holsteiners. I also spent a few minutes today in the *corps legislatif*, as I happened to be passing by.

The 20th. Meyer, who shows me an obliging friendship that I

could not have expected, took me today to his sister, Mme Pobechein, where I did not amuse myself greatly. We went from there to Schlegel's evening gathering.

The 21st. In the collection of the *école des mines*. Meyer proposed that we should go through Haüy's *Crystallographie*[111] together following the models that are there. I accepted this proposal with the provision that I study it first and, as I work my way through it, lecture him on it. Tommelier, a member of the *société philomatique* is the supervisor there. He gave me many friendly reproaches because I had not immediately turned to him for all that I might desire, and in truth, the simple reason was that I did not recognize him as I had never spoken with him in that society; but he had noticed me due to the report I had presented about Ritter's discoveries on light. In the evening in the *Théatre faideau*, where *ma tante Aurora*[112] and *Ambroise*[113] were played. The most interesting thing was that Martin and Elleviou sang and acted very well in it.

On the 22nd I visited Heyberg, heard Charles as usual, and studied Haüy's mineralogy at home in order to prepare myself for seeing more of the collection at the *école des mines*.

The 23rd. To dinner at Merchant Pobechein's, Meyer's brother-in-law, where Heiberg, Harbauer and Pöckelmann, a Danish consul, were present. The party was not of great interest to me but acceptable. Neither Pobechein nor his wife appeals very much to me, and I do not know whether continued acquaintance will change this. On the way home I had a long argument with Heyberg about many of the actions of our government. He mentioned various examples of the most outrageous injustice, but I have the suspicion that they are partly imaginary, at least that was the case when we talked about our laws, where I had the opportunity to show him that he had either not read them or not wanted to understand them properly. Meyer was also there.

111. *Traité de minéralogie*, 5 volumes (1801).

112. *Ma tante Aurore ou, Le roman impromptu* (1803), a comic opera by François Adrien Boieldieu (1775-1834) with a libretto by Charles de Longchamps (1768-1860).

113. *Ambroise ou, Voilà ma journée* (1792), a comedy in one act by Jacques Marie Boutet du Monvel (1745-1812) with music by Nicolas Dalayrac (1753-1809).

The 24th in the *école des mines* with Lehmann. While I occupied myself with Haüy's crystals, he saw the collection which is arranged by departments. He discovered that they only have things from the departments that are closest to Paris, and that the other cabinets were filled indiscriminately with foreign minerals. From there I went with Lehmann to the artisan who manufactures goniometers. He had recently moved to a building which belongs to the nation, and which had previously been a convent. As encouragement, he pays no rent, and the mathematical instruments he manufactures for the government are paid. Nothing had been finished yet but was still under construction.

The 25th studied Haüy in the time not spent on lectures.

The 26th I heard Berthollet in the *école polytechnique*. Afterwards I spoke at length with Desormes and Thenard and saw the exercises which the pupils have every Saturday. They were both somewhat reserved in their behaviour, and I do not know if this was due to bashfulness or pride. Desormes is Guyton's preparator. Therefore I spoke with him about the experiments this chemist had performed on Winterl's *Prolusiones*, as he has been appointed by the National Institute to investigate this treatise. They have performed three experiments, quite poorly, and thus have not obtained anything conclusive, but I predict that Winterl will be condemned. Guyton also lectured today on mineralogy, with some technological remarks, but very poorly. None of the minerals were shown properly, 7 or 8 types were dealt with in one hour, nothing said about them except their names, constituents and a few external characteristics. Nor was what he said about the substances completely free from confusion. It struck me as comical to hear d'Andrada called a *mineralogiste danois celebre*. From there I went with Meyer to a factory where they print paintings on canvas, wood and glass. One can buy upholstery for entire sets of furniture so that they will look as though they had been painted, but the prices are rather high, and the paintings are quite good but not excellent. In particular, I found almost all of them to be stiff, here and there I even found some that were poor and distorted. The most beautiful was that they had printed small paintings on the back of glass and used this for tables and the like. It was really meticulous, and the price struck me as reasonable.

On the 27th I was invited to dinner by Ambassador Dreyer. It was a large party. Most of our countrymen were gathered. I sat with Lehmann and a Lieutenant de Witte from the navy. The conversation was very scattered and hardly ever became general, so I talked with my neighbours quite pleasantly, without there being very much worth telling.
C.

The 28th. In the mineral collection in the *école des mines* and the usual business.
The 29th. The usual business.
The 30th. The time I had left after the usual business in the National Library.
The 31st. Again in the *école des mines*.[114]

April
April 1st at Le Blanc's. I did not find him at home, but one of his associates, to whom I had been recommended by Tommelier, promised to let me know as soon as Le Blanc had a day to go to his crystal factory. I then went to the *conservatoire des arts*, where one cannot see anything at the moment because the directors are busy arranging everything. There I bought Le Blanc's book on crystallization[115], which interests me all the more because it serves as a test of Haüy's crystallography. It is true that this book is very unscientifically written, but it contains experiments which are extremely interesting, and which deserve to be continued by someone who is a better physicist, and for whom it was more important to discover the laws of nature according to which these operations take place than to manufacture crystals for sale. I occupied myself for the rest of the day by writing excerpts of interesting parts of this book and added a number of ideas for new experiments from which I hope for much enlightenment when I get the time to perform them. In the evening I was in the Philomathic Society.

114. The entries from the 28th to the 31st have been crossed out and the following inserted: The following days passed with my usual business.
115. *De la cristallotechnie, ou Essai sur les phénomènes de la cristallisation* (1802).

The 2nd. Heard Berthollet at the *école polytechnique* in addition to the daily business.

The 3rd. Schlegel's lecture. – A visit from Heiberg. – At Classen's for dinner. There I met Count Moltke, a naval officer, who came from a diplomatic mission, and *Kammerherre*[116] Buchwald. The latter knows my father extremely well and still remembers him with respect. The conversation was interesting and mostly dealt with politics and the internal governance of Denmark. I went to Görrike after leaving Classen.

To Professor Manthey:

Paris, April 3rd 1803

I send you the enclosed letter[117] regarding how the physical sciences can be made useful for the state in order perhaps to give you another opportunity to advance the amicable goals you have for me. Should it not be useful for this purpose, I do not regret writing it; thereby I have made the subject much clearer for myself. If it might contain things which you think should not be there, and which can be removed without making it incomplete, I ask you to delete them and give it to one of my brothers, who will have a fine copy made.

From Dresden, I sent a box with books and minerals that I had collected on my journey to Höber in Hamburg, via the Elbe, and asked them to send it on to you. Has this box arrived? I have collected several scientific things which are new to me, but I fear that they are not so to you, but I shall soon select some of the best. You have surely often had to read things that you already knew. For now I shall merely say that Berthollet has discovered that water lasts much longer if the barrels in which it is stored are first carbonised.

It says in the latest issue of *annales de chim.* that an Englishman has cooled water far below the freezing point without its becoming ice by means of the usual tricks, and he has found that water expands continuously the more it is cooled, very far below 0° or 32° Fah.

116. A high official with access to the King's chambers, now honorary.

117. Published in *Nyt Bibliothek for Physik, Medicin og Oeconomie*, Vol. 5, Copenhagen 1803 (pp. 272-83).

Water has its smallest volume at 42 1/2° Fah., above or below this temperature, it expands.

I hope to be able to write more to you again soon. Live well.
Your devoted
Ørsted.

I would be most grateful if you would answer Biot's questions, which can be found in my travel journal.

Continuation of the travel journal:

On the 4th I visited Cadet, a true French scholar. He has learned his chemistry from the French text-books and does not progress any farther. He believed that mineralogy was the science that we study most and was very surprised when he heard that botany has even more adherents because he believed that we did not have many plants. I had to tell him that grapes ripen in our gardens etc. so that he should not believe that our Denmark was among those countries that are covered with eternal ice and snow. Besides, Cadet was so very courteous that I had to forgive him this as well as his assumption that we had nothing but fish to trade with. He gave me some introductions to factories and to a German artist who artificially imitates natural stones. As he was not far away, I went there and found that none of it was of particular significance, and it was just glass covered with coloured putty on the back. His name is Vachelst. The evening in *théatre français*, where for the first time I saw Mlle Contat, one of the most famous French actresses, who has spent a long time in the provinces, play in two different pieces. Connoisseurs find in her the delicacy and elegance which were dominant in the most brilliant days of the French theatre. I can add nothing except that, according to my poor insight, I must also praise her.

The 5th. After Charles' lecture, on the *champs élysés* all the way out to the *Barrière*. These Elysian fields are provided with trees for shade, with tents and small houses for restaurants, coffee houses etc., and the entire route, which goes out to the *bois de bouologne* is so provided. The barriers are some of the most bizarre and ridiculous things with which the French nation has ever prostituted itself in architecture.

These octroi houses are here two formless masses, surrounded with pillars that do not belong to any previously known style and thus must be said to be of the French style; these pillars consist of nothing but square and round plates which are alternated one upon the other. Each barrier has its own shape, I have not yet seen them all. In the evening in the *theatre des jeunes éléves* with Gjerlev and Lehmann. This theatre is small and visited only by the lower classes and seldom by foreigners. It does not deserve to be seen much more than once. Young people, of whom scarcely anyone was over twenty-two or three, play all the roles indiscriminately.

The 6th. A promenade to Longchamps. In the old days people went out there during Easter week, Ash Wednesday, Maundy Thursday, and Good Friday, to hear mass. Now they go there to be seen. The fashionable drive or ride there, most people walk. The entire route is filled with carriages and people from 3 in the afternoon until 7 or 8 in the evening. Anyone who is a friend of fine equipages will certainly be pleased here, for everything here is at its greatest splendour during those days. They save for several months in order to have a beautiful equipage on that day, they pawn their winter clothing; in short, they are as besotted as people in Copenhagen are about their trip to the Deer Park on Midsummer Day. The distance to this Longchamps, which is in the *bois de boulogne*, is not long, I think it can best be compared with that from Copenhagen to Friedrichsberg. Everywhere there are provisions for amusement and comfort though one cannot really claim that this tour is amusing. Along the entire route one can find chairs in which one can, for a few sous, sit and watch the entire parade to one's heart's content; at every step there are restaurants where one can eat dinner and supper, coffee-houses with all kinds of refreshments, carriages in which one can continue the tour, and the like. Obviously, on this occasion one sees all the oddities of fashion, and this really gives the spectator something of interest. A pamphlet writer of some wit, who has undoubtedly seen this parade more often, has given a description of it in the spirit of the day and indicates how one can distinguish the people there. "If you see a well dressed woman," he says, "with noble deportment and gentle eyes sitting beside a serious old man, if her white dress only seems to be a picture of the purity of her heart,

if she, good wife and good mother, brings her children with her, then you can be sure that she is a foreigner." (*De ce signe seulement dis c'est une étrangère, oui c'est une étrangère*[118]). The second class, according to him, consists of the women who have recently come from the provinces, without breeding and without taste, who have sold their charms to the richest; beauty as a consequence of perfect health still distinguishes them, but otherwise he is not favourable to them. *Quand tu vois femme coquette à l'air gauche, en maintien guindé, que tu vois qu'à sa toilette, Creusus seul ait preside … quand les Zephirs* [inserted] *desirs* [deleted] *et les plaisirs* [deleted] *desir de ses appas decouvrent peu de chose … du province l'autre jour elle nous apporte l'amour sur un bouquet de rose*[119]. The frivolous Parisian woman, who seems to have borrowed from Amor's mother her graces and weaknesses as simple but tasteful decoration, has the advantage over them all according to the author (*j'etais nouveau Pâris, à cette Venus de Paris, je donnerais la pomme*[120]). I find all this so typical that I could not resist mentioning it here. I must also mention the sarcasm directed at those people who currently write much in favour of the Catholic religion and much against reason, people who are now quite the fashion here. Regarding the very short coats which elegant gentlemen are wearing, and which almost look like vests, he says that they are clipped coats and mentions that people also clip coins and much else, in brief *on rogne sur tout, et l'on dit, qu'à Paris, chose très commode, un auteur doit rogner sur l'esprit, s'il veut être auteur à la mode*[121].

The leader of the heroes of faith here is an Abbé Geoffroy, who is also a drama critic. They have taken revenge on him in a number of caricatures. In the wittiest of them he is standing on his journal (*Journal de Débats*), which is on his desk, in order to reach for a genius who is wearing Voltaire's laurel wreath. His friends shout, "Mr. Abbé, you'll break your neck." On his desk there are a number of

118. From this sign alone, say that she is foreign, yes, she is foreign.

119. When you see a coquettish woman with an awkward air, with an affected manner, when you see that Croesus alone has chosen her apparel … when the sons of Zephyr and the attraction of her charms only reveal little … from the provinces she brings us love in a bouquet of roses the next day.

120. If I were a new Paris, I would give the apple to this Venus of Paris.

121. They cut down on everything, and they say that in Paris an author should, very conveniently, cut down on wit if he wants to be fashionable.

inferior journals, on the floor the most respected scholarly works, on his shelf a number of well-bound books of indifferent quality. In another caricature he is sitting on a balance pan, and as a counterweight someone has put a volume of Rousseau on the other pan, and this lifts both the Abbé and his journal. There are at least four caricatures of him.

The journals here are dominated by shameful flattery and a contemptuous compliance with the will of those in power. I have found no-one who has dared to say the slightest against the Catholic religion and even less against its decrees. The closest anyone gets is to believe much can be said in praise of Voltaire and Rousseau. Recently, Geoffroy attacked a collaborator on a dictionary of natural history for having shown himself favourable towards atheism and Spinozism (two quite opposite things), and the fellow found this so dangerous for his happiness that he wrote a very courteous, one could well call it ingratiating, letter in which he denied this and proved that he was a good Catholic, whereupon the Abbé confirmed his honour. The shamelessness has gone so far that the poet Delille has recently said in a poem, called *la pitié*, that emigrants had taken the path of honour. A newspaper, *le citoyen français*, has at least dared to ask him which path the heroes who spilled their blood for the republic had taken if it was that of honour which had been taken by those who bore the shield of the enemy against their fatherland.

In spite of all my caution, I caught a cold while on the promenade to *Longchamps* so that I have been forced to remain indoors for a long time. However, I have attended Charles' lectures, and have also been at Vauquelin's when the weather was good. Besides, I have spent some time reading several French writings that are regarded as classics, partly to become better acquainted with this language and partly to avoid embarrassment when the conversation turns to these authors at parties, as it is regarded as shameful not to know them. The widely celebrated Racine was among the first I turned my attention to, and his powerful predecessor Corneille came next. If elegance combined with a certain dignity was the only virtue of poetry, I would certainly agree with the French that he was one of the greatest poets of recent times. But it is unfortunate that

he chose drama, for his characters do not show their thoughts in their actions but say what they think. Therefore, they all speak in the same way, and a Frenchman would be offended if a solider spoke like a solider and a servant like a servant in a tragedy; only comedy dares to be so common. The praise given to Shakespeare by an expert that one could obliterate the names of the characters and still be able to determine what lines belonged to each cannot be applied here. It also makes an unpleasant impression that the same ideas reappear in all the plays, only with different names. *Fèdre*[122] is the only one of his plays which I can say I have read with pleasure. French etiquette is all too prominent in all the others. Naturally, it must lead to an endless monotony in all French tragedies that they only use the repetitive Alexandrines. As a consequence of the lack of long and short syllables in the language, it may be impossible to permit free style and verse of 3 or 4 different forms to alternate according to the character of the speech in each passage, but if it could be done, all the French critics would rise up against it. It seems to me that the plays which Corneille has written using plots taken from the Spanish are without comparison the best because they are full of imagination and power. Cid, Don Sancho and the comedy *le menteur*[123] have no equal in French regarding their inventiveness.

Voltaire had many good ideas for the improvement of French literature, but partly the language and the already ingrown prejudices created too many obstacles, and partly he himself lacked the higher spirit which should have led him to a higher degree of perfection. The French language in general is one of the most slavish that can be imagined. The farther I progress in it, and the more I am told that I am close to writing it quite well, the more flaws I find in it. Should one believe that it is not considered appropriate to use metaphors that have not been used by the classical authors? It is easy to see how many obstacles this cowardly criticism must create for all progress. The new must always follow the path of the old and must never depart from the most insipid imitation. French grammar

122. *Phèdre* (1677), tragedy by Jean Racine.

123. *Le Cid* (1637), *Don Sanche d'Aragon* (1650), and *Le Menteur* (1644) are all by Pierre Corneille.

is highly developed but more as a rich collection of rules than as a science based on principles; what the Academy has said, what Racine, Bossuet, Fénélon etc. have used, that is more important than the results of healthy language criticism. Still, I do not want to fill my entire letter with such complaints.[124] As little as I must value the French nation and the French spirit in science and the arts, it is still undeniable that he who knows how to profit from circumstances and from the few honourable scholars here will find a better opportunity to study here than anywhere else.

May 10th I accomplished little other than reading several French authors at home and attending a few lectures.

The 10th the *corps législatif*. I attended the assembly, which was short from start to finish. The assembly hall, which is in the former *hotel d'orléans*, is very beautiful. The members and the President enter in procession with full military music and exit in the same way. There is but little room for spectators so that the public cannot have the great influence on the debates which it had in republican days.

The 11th and 12th to Charles and Vauquelin and what the day otherwise brought.

124. The following note in Mathilde Ørsted's handwriting has been pasted into the manuscript. The note is an almost direct quotation from H. C. Ørsted's autobiography in H. A. Kofod, *Conversations-Lexicon*, vol. 28, pp. 515-41 (A. Soldin 1828). "In a brief autobiography Ø has indicated that he has not maintained the view of the French language advanced here; he says: that he had brought with him from Germany a strong prejudice against the French language and for some time had considered its imperfections to be greater and its advantages to be smaller than was reasonable; however, he soon realised that its aspiration for the highest degree of clarity deserves emulation; so that he believed that he, as a Danish writer, would also benefit from having practised the rigourous demands of the French language for comprehensibility and accuracy, stylistic virtues that he had always greatly appreciated when he had so often seen vague and immature thoughts cloaked in similar language passed off as profundities. On the other hand, he believed that one should not imitate the verbosity of their delivery, which makes it burdensome for thoughtful readers without, as is intended, gaining in clarity, which is best achieved when the right word is put in the right place."

To Professor Manthey:

Paris, May 12th 1803

I have again been ailing with a cold for a long time and am still not completely well. The climate here does not agree with me; the alternations between heat and cold are extremely frequent here and harmful to me. Now and again I feel touches of arthritis, which are not yet very painful, but which do cause me concern. Due to my indisposition I have mostly been forced to stay inside so that I have accomplished far less than I wished, and many times I have even been unable to work at home. I have tried to force myself, but that only made things worse. I now place my hopes on the better season, which has been much delayed this year; in the last 3 weeks we have not had 3 nice days in a row. – It is now time to think about the plans for the continuation of my journey. Switzerland, the south of France and Holland lie before me, but I see no way to avail myself of more than the last of these countries. To remain here another two to three months does not seem excessive. Autumn will be approaching then, and if I am to derive some benefit from Holland and return home before winter, I do not think it possible to attempt more. Or perhaps I should shorten my stay here in order to travel through Switzerland, thence down the Rhine to Holland. It would certainly be a most pleasant and instructive journey, and I could even have the advantage of making it in the company of my friend Lehmann, which would be a tremendous gain with regard to both enjoyment and utility. The question is only, given my individual manner of studying, whether it would not be better to spend 2 more months in Paris than on such a journey, where I would find little benefit for chemistry. It would hardly be right to extend my travel for a longer period, you know the reasons. Besides, even if I wanted to include a month or two of the winter, this would be questionable since this time would be spent in Holland, where the season is surely most unfavourable and might even be dangerous for my health, as on my journeys I have often felt the most harmful effects of raw cold air when I was forced to be exposed to it at night, in open carriages etc. If you agree with my opinion, I shall thus come home in Oct. or Nov. It is possible that Jörgensen would protest against paying the

final half-year's grant; therefore I have a solution, which strikes me as quite good, that is, to take a short trip to Sweden, which, for the sake of the grant, needed to be of only a few weeks' duration. It is not my intention thus to enrich myself, but I do not think that the grant will be sufficient in any other way. My treatise on Winterl has now been published. I have had my book-seller send copies of it to my chemical friends, among them one for you, one for **Hauch**, and one for **Steffens**. I am very displeased that the printing has gone wrong so that what is on pp. 116-139 should be the end of the first *Prolusion*. The letter which I wrote to you about W. induced me to write a similar one for the printed edition, with the sole difference that I here chose a fictitious correspondent, whom I have imagined to be more or less as the present chemical audience seems to me to be. I have also left out a few things which might easily have angered the Duke and other good people. Do I have to present the Duke with a copy of it?

I would like to give you some scientific news, but it is not easy for me to report anything to you before it appears in Friedländer's *Journal*; for this man runs about to all the scholars and usually has extracts of treatises before they appear in the National Institute. I have seen his latest numbers, which are very complete. At present I am again forced to take around 1500 livres from Görrike. With that amount I anticipate that I shall have sufficient for the remainder of my stay in Paris.

I take the opportunity to send my receipt for the June grant.

At Görrike's request, I have spoken with Gandolphi, who has been very busy at the mint in connection with the new coins, but he promises to begin work on your balance in 3 weeks and to continue until it is finished.

Your devoted
Ørsted.

Continuation of the travel journal:

On the 13th in the *société philomatique*, where I read a report on Ritter's experiments with the voltaic cell. It met with generous approval, and the President thanked me for it on behalf of the Society. When

this séance was over, Biot asked me to write to Ritter that he ought, sooner or later, to send a report on the discoveries he had made during the past year as it seems certain that he would be awarded the Institute's prize (3000 livres).

The 14th. Charles, Vauquelin, Gandolphi, the artisan who is working on a balance for Professor Manthey, which will soon be finished.

The 15th. Charles' lectures, Schlegel's lectures, evening party at Schlegel's.

The 16de Vauquelin. At the National Institute. The National Institute is often very boring because they do not always know how to fill two hours every week, but now and then it is very interesting; it is only that the listeners far too often are in the unpleasant situation that they cannot hear cannot easily hear at one end what is being said at the other. Nothing remarkable happened today.

The 17th Cuvier's lectures at the Athenaeum. These are among the most interesting I have had the opportunity to attend. Here he deals with the philosophy of natural history. So far it has only been the history of science, but he will soon start to deal with the subject proper. What distinguishes him at a glance is a learning which the French hardly ever possess. He speaks about Aristotle, about Pliny, about Gesner, about Leibniz so that one can hear that he knows more about them than just hearsay. He combines with this a view of the whole which few scholars possess. He knows how to present the influence which each great man has had on the spirit of science without mentioning the details of his discoveries. He presents the spirit of science and takes the opportunity to show how this or that individual mind stood in relation to it. This is not enough for him; he also casts a glance at the history of mankind in order to show the relationship between the development of man and the progress of science. He considers the complete organisation of the earth in order to show some of the primary laws according to which Nature has spread her treasures, and from there he again looks at what cause these great relationships have given to this or that specialised development of science. To him natural history is not merely a list of objects but rather an interwoven whole. Although he is not a chemist, he has an understanding of that science, and I have often

heard more valid judgements from him than from most professional chemists. Naturally, I have not always been satisfied with his assertions, but that has not often been the case. His delivery is fluent and beautiful without being decorated with the empty rhetorical phrases of the French. His voice is not particularly pleasant. I have noticed that his value is so generally appreciated that all the listeners who are in the reading room immediately put their books aside without finishing the sentence when it is announced that Cuvier is to begin.

The 18th. Hamilton, a Scottish scholar, who has thorough knowledge of the Indian language but is also interested in physics, had expressed the desire to meet me to Schlegel, who had spoken about me to him. Therefore Schlegel asked me to come to see him today at the National Library, and from there we went together to Hamilton. He received me with particular courtesy and promised to establish a connection between me and several English scholars. I am very pleased with this as I believe that our Danish scholars have little connection with the English. While at the National Library I looked at the manuscripts, which are nicely displayed in cabinets with latticed doors of steel wire. Several scholars, especially foreigners, work in this hall, and they always have a few library assistants partly to keep watch and partly to be of service.

The 19th and 20th daily business. – In the *société philomatique*.

The 21st was wasted with completely futile visits to Cuvier, Berthollet, Görrike etc., none of whom were at home. Consul Classen was not at home either although I did find his wife, who can almost be considered a dwarf, but she is very cultured. I spoke with her for quite a long time.

The 22nd. I have now found a new countryman here, **Uldahl**, a botanist and a student of Vahl. I accompanied him today to the *jardin des plantes*, and we visited Haüy, Thonie, Jussieu and Desfontaines. I had not met the last three before but found their conversation very interesting. Jussieu showed us how he preserves his plants, and how he can find each of them again. Some botanists are almost always working in his study, examining his herbarium, and at every moment they have the opportunity to seek his advice; a promptitude which cannot but have the most wonderful consequences for

science. Desfontaines showed us how the internal organisation of the large plant families *monocotyledones* and *dicotyledones* differs. As is well known, botany owes this important discovery to him. Haüy is busy working on a text-book in physics[125], which the First Consul has ordered him to complete within 6 months, during which time he has been exempted from his lectures. This text-book will merely contain the part of physics which is not mathematics, but it can be expected that this part will be treated very mathematically, and from this aspect receive a very high degree of development, which naturally cannot avoid being one-sided; however, the right naturalist will certainly know how to value it. One must praise Buonaparte's good choices in the assignment of tasks. One sees with amazement that he has passed over the other physicists, who have made a profession of it, in order to chose a man who otherwise seems to have established himself in another subject, but who is certainly a more thorough physicist than any of the others who could have been chosen. I was invited to dinner at Guyton's. It was not very interesting as almost all the guests were foreigners, and one sees enough of them in Paris without Guyton's help. One of the Frenchmen who were present had been in Egypt and had several interesting anecdotes to tell. I learned from others that the reason why he had gone to Egypt was that he was quite unable to prevent his only beloved son from going there. He came with him and suffered the grief of watching him die in his arms of the plague. The grieving father often wishes that he could have died instead. His name is Champagne or Champignie. He is the supervisor at the arsenal. Most of my conversation was with Mme Guyton, a learned old lady, who has translated Bergmann's writings from Swedish and Werner's from German.

The 23rd. A visit from Hamilton. The National Library. Fabritius from Kiel has recently arrived here. I met him today in the restaurant where I usually eat. He shows much courtesy to his countrymen.

On the 24th I wanted to visit Cuvier again but found only his brother at home. I was there with Friedländer and a Dr. Schmidt

125. *Traité élémentaire de physique*, 2 volumes (1803, 1806).

from Leipzig. I again visited Haüy on the same occasion. He complained that, although he otherwise knew how to explain all the phenomena that are brought about by galvanism, he simply could not understand the experiments that Fourcroy, Vauquelin and Thenard had reported regarding the reduction of horn silver at the positive pole. He said that therefore he had to ignore them. I answered that it was to his great honour that he could not explain these experiments because they were incorrect. I told him how Ritter had disproved them, and how I had confirmed this with my own experiments. This made him particularly satisfied. Today Biot lectured at the Athenaeum on electricity. His experiments had limited success. This evening I heard Cuvier, which is always a pleasure for me.

The 25th stayed at home and wrote.

The 26th. Vauquelin. In the evening at Lehmann's with Schulz and Bergmann. The latter had had the opportunity to see Chaptal's sulphuric acid works by means of large bribes, and we forced him gently to tell us what he had seen there. It is mostly mechanical devices which are quite simple, and that is precisely the reason why no-one is allowed to see them as it is feared that someone will take advantage of it.

The 27th. Daily business. In the evening in the *théatre Montensier* with Uldahl and Lehmann. We met Charles there. There are very few plays at this theatre although it is called the *théatre de varietés amusantes*, and the pieces that they play are mostly written for the taste of the lower classes, but the actor Brunet draws crowds with the naturalness and the strength of his acting. He really seems to be the character he is playing, but he plays very few roles, and these are almost all of a single class. The character is most foolishly simple-minded.

The 28th. Daily business. Walked in the Tuillerie Gardens with Charles. – In the evening at Schulz's with Uldahl, Lehmann and Dr. Flügge. The conversation was mostly about botany, about which Flügge possesses extensive knowledge.

The 29th. Visited Guyton, but I only found Madame at home. At the National Institute, where I had an appointment to meet Biot. Visit from Krohn and Lehmann in the evening.

The 30th. Dinner at Hamilton's.

The 31st. With Friedländer and Dr. Buch from Berlin at the Vaccine Institute[126], which is far too simple to write about here. At Lehmann's, where I met Bergmann, who had recently obtained my treatise on Winterl. He was very angry about it and argued heatedly against it, but I remained cool-headed and allowed him to show me every place where he had an objection. He believed that most of the experiments of Winterl that I had mentioned contradicted known experience, but I convinced him almost everywhere that they contradicted only known hypotheses. He so allowed himself to be brought to reason that he is now busy repeating some of the experiments and no longer believes that he thereby performs merely an *opus operatum*[127]. I would like a similar discussion of this subject with many chemists. In the museum with Lehmann. – Cuvier's lecture.

June

On the 1st with Friedländer to Berthollet, who lives in Arceuil about a mile from Paris. We met him in his laboratory, where he was busy with experiments on dyeing. We can soon expect a new edition of his *éléments de l'art à teindre*[128]. He will also establish a large dye-works in the vicinity. We walked for half an hour in his charming garden, and we were later in his library. Friedländer spoke with him about politics, which seems to interest him; I turned the conversation to chemical subjects as often as I could. I spoke with him particularly about the use of mathematics in chemistry according to his own discoveries. He satisfied me greatly. I had the pleasure of hearing him speak with all due respect about Richter's *Stoichiometry*[129], of which Pfaff had given him an excerpt. On the way home Friedländer told me an interesting anecdote about Berthollet from the time of the revolution. The army had sent distilled spirits which were said to be poisoned to the Welfare Commission. It was immediately de-

126. *La société de Vaccine* in Paris, founded to promote the use of vaccination against small pox.

127. Work done.

128. *Éléments de l'art de la teinture* (1791, 1809).

129. *Anfangsgründe der Stöchyometrie oder Meßkunst chymischer Elemente*, 3 vols. (1792-94).

livered to Berthollet and a few other chemists, who were to prepare a report about it before evening in order to satisfy the prompt justice of the times. They declared that there was no poison, but that the spirits had merely been mixed with impure water so that it could be drunk without harm if it was filtered. Robespierre, who had expected to find the seeds of a conspiracy, jumped indignantly from his seat and said that it was easy for them to make such a statement as they would not have to drink it. Berthollet immediately requested a large glass, filled it with the filtered spirits and emptied it. "You have courage, Citizen," they said to him. "Not as much," he answered, "as when I wrote the report." His colleagues now followed his example, and the tyrant had to be silent. It is certain that Berthollet, since the time when he was in Egypt with Buonaparte, has been among his confidants. He is a senator and has a large income. – Today I received letters from Ritter and Winterl. The latter intends to publish the *Accessiones*[130] to his *Prolusiones*. At Lehmann's in the evening.

The 2nd with the engineer Le Noir. Mirbel's lecture on botany. It is always of interest to me to hear lectures from different people. One learns so much with regard to method. Mirbel appears to have a reasonable head and good knowledge, but there is no life in his delivery. He does not know how to raise the important above the unimportant by the manner in which he expresses it or by the context in which he places it; in short, there is neither light nor shadow. One also encounters this strange monotony in his physiology of plants, a book which is otherwise not without merit and contains several discoveries in plant physiology. In the evening Sicard held a lecture at the Athenaeum and performed some tests with his deaf-mutes.

The 3rd. Vauquelin's lecture and other daily business.

Den 4de. Biot on galvanism. In the evening in the *théatre Louvois*, where they performed a new comedy by Collin d'Harleville. It has the title of *Le vieillard et la jeunesse*[131] and has the aim of showing a respectable and, what is more important here, amiable old man con-

130. Additions.

131. *Le Vieillard et les jeunes gens* (1803), comedy by Jean François Collin d'Harleville.

trasted with a pair of despicable and, what is even worse, ridiculous young people. The play has many witty passages, which produced emphatic applause.

June

The 5th. Daily business. In the evening in the *théatre de gaiété*, one of the boulevard theatres. They frequently present plays whose contents are taken from German novels. It is thus common here to find plays of greater originality, of greater richness of plot, of greater strength than original French plays. Therefore they are also less correct and less adorned than French rhetoric.

The 6th. Mirbel's lecture at the Athenaeum. Dinner at Görrike's, where I found Dr. Meyer from Holstein, who has succeeded Blohme, who recently died here. He is a strange person who has lived for 20 years in Leipzig by writing, especially translating. (He is 40 years old.)

The 7th, 8th and 9th. Daily business and things about which I have often spoken.

On the 10th I visited Le Noir, the engineer, by whom I have had a needle made of zinc and silver which, according to Ritter's discovery, must behave like a magnet and point north and south. On this occasion I took a tour on the boulevards. I have taken this tour often but never with such pleasure, perhaps because the weather was beautiful, which has seldom been the case when I have taken a long tour there, perhaps because I was more inclined to be observant today. In this regard, I am quite changeable, but generally I have noticed that I am most inclined to be observant when I am rather tired from studying or other work. It is not my intention to give a description here of what I saw; I could do nothing more than repeat what Schulz has said in his interesting journey to Paris[132]. I shall merely mention here that they have recently constructed an arcade by the boulevards with the name of *passage de panorama*, where, in addition to what gives it its name, there are several beautiful boutiques and a splendid coffee-house. Among the boutiques, one is remarkable for its alabaster copies of the most beautiful antiquities. It is a genuine pleasure to look at them. I entered the shop, looked at the

132. *über Paris und die Pariser* (1791).

most beautiful ones, enquired the price and took the address in order to recommend him back home.

The 11th to the 14th. Lectures I have spoken of already and other similar tasks filled these days.

The 15th. At Classen's for dinner, where the Tutin family, Fabricius, Uldahl, Hasler were present. In the evening at Lehmann's with Prof. Aldini from Italy, who is to publish a work on galvanism for which he needed some information from me. His greatest merit is that he has the honour of being Galvani's nephew. I do not intend to give him very much. I shall not go farther than a short report on Ritter's discoveries, of which he is ignorant like so many other scholars here.

The 16th. Daily business. *Séance litteraire* at the Athenaeum. Gail read something about Virgil, Grandmaison a translation from Spanish, and Chazet a witty description of a painting that shows Molière reading his *Tartuffe*[133] in Ninon l'anclos's [Lenclos'] house in the company of the most famous men of that time. The first two read such miserably poor work that one could only admire the patience of the audience, who even applauded them at the end.

The 17th. *Conservatoire des arts et métiers*. The plan for this institution is beautiful. It is the intention to display the tools and machines used in factories, industries, agriculture etc. They also want to encourage new inventions. As this institution is connected with the public exhibition which will take place before I leave Paris, I shall not go into any details about it now. Hatzenfratz showed it to the members of the Athenaeum today. It is otherwise difficult to see because it is not yet finished. They have recently erected a statue for General Dessaix. It stands in a rather small open space near the *palais de justice*. The pedestal is a fountain; thus one is uncomfortably embarrassed by not knowing whether the Republic uses its famous generals' statues to embellish the city's fountains, or whether they construct fountains so that the space used to honour generals is not wasted. In the evening in the *Société philomatique*, where I gave a report on Ritter's discoveries on magnetism. The President thanked me on behalf of the Society.

133. *Tartuffe, ou l'Imposteur* (1664), comedy by Molière.

The 18th and 19th worked at home, attended lectures and saw a procession at the Sulpice church. This procession was oddly enough composed of soldiers and priests, which had a comical effect on me. I have rarely seen so many stupid faces in one place as these priests'. The soldiers seemed to be concerned only with following their officers' orders. The Prefect of the district and other officials were also there to perform their devotions in their official capacity.

The 20th. The public meeting of the National Institute. They read a report on everything undertaken by the Institute over the last ¼ year. Cuvier had written the part on the natural sciences in general, Delambre that on mathematics, Biot that on galvanism. Fourcroy read a treatise on the stones that have fallen from the sky, Ramond one on his journey to *mont perdu*. A visit from **Rist** in the evening. I had already met him at Classen's and today at the National Institute. He is staying here for a few weeks in order to see Paris; then he travels to Spain as secretary to the legation.

The 21st. Dinner with Hamilton, who introduced me to an Italian Count Malocarli, who is going to study natural science here and wanted my advice. – Cuvier's lecture at the Athenaeum. – In the evening in the company of Bergmann and Lehmann.

The 22nd and 23rd nothing new. – The 23rd in the evening at Gjerlev's in the company of Rist, Baggesen, Lehmann.

The 24th. In the porcelain factory at Sevres. This factory does not excel in its forms and their execution as I had expected. A few beautiful things but not everything. It seems to me that Fourmi's work is much better with regard to form than the products of the porcelain factory. Seeing this factory, it occurred to me that porcelain factories actually occupy themselves with a great many things that do not concern them. I include in this the large quantity of biscuit which, even when it is made with the greatest diligence, cannot stand close scrutiny and can never compare with plaster casts, which are far less expensive, and even less with the copies of antiquities in alabaster which are sold here in Paris at prices lower than porcelain. The advantages of porcelain are its hardness, a beautiful and robust glaze, beautiful colour, strength, etc. Thus, there is much to recommend its use, but to use it to create mere works of art seems to me to have very little to recommend it. Therefore, I have

little taste for the historical paintings, portraits etc. with which porcelain is made expensive. They can never be works of art, and even if that were possible, should a true artist spend his time on such a perishable material? – In the evening in the *Société Philomatique*.

The 25th-27th. Daily business. In the evening of the 26th in Tivoli, one of the most beautiful public gardens in Paris, on the 27th seen *la femme à deux maris*[134] in the *ambigue comique*. The roles of 2 robbers were played extremely well. The *amb. com.* is one of the boulevard theatres and has much the same character as the others.

To Professor Manthey:

Paris, June 27th 1803

Your advice that I should go to England would be entirely consistent with my own wishes if my personal circumstances were not unfavourable. I do not speak the English language even though I understand it rather well. You know how much of a difficulty this is, and one that is not easily overcome. A conservative estimate demands at least half a year's stay there in order to reach the point where one can speak with people who are not used to contact with foreigners. Even if I could obtain a supplement to my grant of 4 or 5 hundred rix-dollars, it would scarcely be sufficient for two months in England, and this would undoubtedly be far too short a time to profit significantly. You have previously written that the first 400 Rd. had been granted to me from the royal treasury primarily because I intended to go to England; but the gentlemen in the college of finance cannot insist that I make a trip to England for 400 Rd. If I had been given 400 per year, I just might have considered it. – Finally, do I dare to keep Sophie waiting so long with empty promises of my return? She can quite rightly demand that I should turn all my thoughts to establishing a home. And nothing can be done about that until I come home. Moreover, I have already made plans for a great deal of work in physics and chemistry when I come home. It would be greatly to my advantage to get this done soon. If I were

134. Melodrama (1802) in 3 acts by René Charles Guilbert de Pixérécourt (1773-1844), published 1822.

to work for a few of years at home and then go to England with royal support, after first becoming known to the scholars of this country through my scientific work, this would turn out more to my advantage. – In order to do everything possible, I have consulted my friend and countryman Lehmann, who stayed in England for 2 or 3 years under favourable circumstances and saw much of the factories there; he advises against a journey now. – Although I agree with you in believing that I ought to desire a trip to England, I do not regard it as advisable at the moment. I am eager to hear your thoughts about this and about what I wrote in my previous letter.

You may be aware that a mineral dealer in England recently sold a supposedly new metal which, with regard to its properties, is between platina and silver. One now knows that this metal consists of mercury and silver. It is a quite remarkable combination and more important than a new metal; for who would have believed that the combination of silver and mercury was more difficult to melt than silver itself and almost as difficult as platina, that this mixture could be precipitated in metallic form from a solution of iron sulphate etc.? – This is the only news here that I suspect has not yet reached you.

Forgive my haste today. I hope to write to you at greater length within 2 weeks.
Your devoted
Ørsted.

Continuation of the travel journal:

On the 28th I visited Cuvier, who showed me his anatomical collection, which is exceedingly beautiful and important for comparative anatomy. – On the same occasion I visited Haüy, who is extremely busy with the publication of his physics book. He was not actually at home but rather walking in the garden. He is quite displeased with Berthollet's objections to his crystallography.

The 29th and 30th daily business.

July 1st
At Versailles with Friedländer and 6 other German doctors. We saw the picture gallery, the garden, the *petit trianon*, etc. The picture gallery consists mainly of the works of French painters, of which I am no great admirer. From the palace, where this gallery is, there is a very beautiful view across the garden and the surrounding area, but one would almost believe that the garden had been designed to be seen from above; for although it is quite beautiful, it makes less of an impression when one is there than when one looks upon it from above. The *Petit Trianon* used to belong to the Queen but now belongs to a restaurateur, who will open the door for a livre. There is a garden with many small huts scattered about, which probably once served to hide the magnificence of the court beneath their humble exteriors.

The 2nd. Performed galvanic experiments in the presence of Malocarli and Hamilton.

The 3rd-9th nothing new. The National Institute, lectures, a concert in the Athenaeum, the *société philomatique*, Aldini etc. have occupied my time.

July
The 10th visited the Ambassador, who stays at *la muette* in the summer. I was in the company of Gjerlev; we had taken a cabriolet together, which also had to serve to get us to St. Cloud. Dreyer had invited us to dinner, and as it was still early, we thought that we could do no better than to enjoy the pleasant promenade in the garden at St. Cloud. This garden is laid out in the so-called English style, and with little magnificence, so that it rather resembles a wood. One finds restaurants, coffee-houses, boutiques, in short, everything that indicates a large crowd of people. The palace of St. Cloud is situated on a hill which dominates the surroundings, and it would not be difficult to defend it in the event of an attack from the people. It is not yet possible to see the interior of the palace. At dinner we found Consul Classen and his wife, who also have their summer residence here. It was very informal, and Dreyer recalled his years at university and his university friends. I won his favour by knowing the remarkable university events from that time. He as-

sured me that I knew these things as well as if I had been there. Before dinner he told me something which amused me greatly. Professor Aldini, whom I have already mentioned, a rather ignorant Italian professor who travels around and gives himself airs with galvanism because he is the son of Galvani's sister, believes himself destined to enlighten all the nations north of Italy. Therefore the ambassador of the Italian Republic also offered Dreyer that Aldini could come to Denmark to introduce galvanism there. Dreyer answered very sensibly that he did not know anything about it and therefore did not know whether this would be useful for his country. Dreyer then asked me what I thought about it. I gave him a clear idea about galvanism and also told him who Aldini was, and what his merits were. We talked about several other new discoveries, and Dreyer seemed very satisfied with the information I gave him about them.

The 11th. The National Institute and the like.

The 12th to the 17th nothing new except the celebration of the revolution on the 14th. They celebrated the destruction of the Bastille. The police had invited all citizens to illuminate their houses, but very few complied. Only the government palaces were illuminated and that indifferently. This celebration, which is not just a celebration of the revolution but a celebration of humanity since one of the most shameful prisons, one of the most abominable pillars of tyranny was pulled down on that day, is celebrated with less splendour and less enthusiasm every year. Thus the spirit of freedom has become so unfashionable in France that they no longer even take pleasure in commemorating the abolition of slavery.

On the 18th I visited the tapestry factory with Gjerlev and Lehmann. It is undoubtedly a feat to weave so that it resembles a painting or rather an embroidery. Lehmann observed quite rightly that this technique is a kind of embroidery mixed with weaving; it is really like embroidering the cloth while weaving it. This factory is not profitable but is solely intended to provide magnificent tapestries for the government, partly to decorate its own halls and partly to be given to the rulers of other nations. One can easily imagine how expensive these tapestries are when one knows that they work on one of them for 3, 4 or 5 years, and that a worker receives 3 to 4 livres

daily. To this must be added that those who, due to age or infirmity, particularly due to weakened eyes, are no longer able to work are supported at the expense of the factory.

The 19th. Ate dinner with Görrike in the company of Lehmann, Fabricius, Baggesen and Gjerlev. There was also a certain Claussen, born in Kiel but currently Russian court councillor. He had spent some years in Copenhagen to seek his fortune but did not find it. As a result, he did not like Denmark. He began our acquaintance with complaints about Copenhagen and praise for Petersborg's excellence. Later he went through old Bernsdorf's mistakes, then on to Kant, and thus he criticized all Europe. I was his neighbour and was obliged to refute much of what he said. When I observed that he took particular pleasure in slandering Kant, I went at him about that and soon caused him extreme embarrassment, which Baggesen intensified with bitter sarcasms sprinkled here and there.

The 20th. I visited the Institute for the Blind with Gjerlev. This institute is so thoroughly described in several books that I have nothing to add.

On the 21st I made the acquaintance of the English chemist Chenevix, with whom I had been invited to lunch at Friedländer's. Like most Englishmen, he is of no great interest until one knows him better.

On the 22nd with Lehmann, Gjerlev and Dr. Schmidt at St. Cloud, where one can now see the interior as the Consul is in the Netherlands. A number of beautiful paintings, some of which have been taken from the picture gallery here, decorate the halls, but I can otherwise find nothing to say about this palace that could not be said about so many others. The magnificence which was already there is often increased by the new additions. Not everything has been finished yet. It is not possible to see all the rooms.

The 23rd. To dinner with the Ambassador and most of our countrymen. Major General Waltersdorf and Doctor Portal were also there. In the evening all our countrymen, with the exception of Waltersdorf, were gathered at Lehmann's, who thus wanted to give them the opportunity to say good-bye to Gjerlev, who is leaving soon.

The 24th. Went to a play at the *théatre de la cité*, one of the many insignificant small theatres in Paris.

The 25 and 26th daily business. Saw Bertrand's museum, which consists of very lifelike representations of anatomico-pathological specimens, especially those that show the true effects of venereal diseases in their most horrifying form.

The 27th. Cuvier has recently begun a series of lectures on comparative anatomy in the jardin de plantes. Although this is not really my subject, I attend them, at least as long as the exposition of the general laws continues as Cuvier knows how to present them with a felicitous clarity.

The 28th-30th. Daily business. In the evening with Lehmann in the *hameau de Chantilly*. The *Ham. de Ch.* is one of the beautiful public gardens in which one can stroll for a certain entrance fee. Everything in such gardens is arranged for the amusement of the general public. Games had been set up on a canal, where some boys armed with wooden lances were rowed in various boats towards each other and competed in knocking each other into the water. On this canal, which is about the size of an average sitting room, Parisians row around for hours to their great satisfaction. There are also various kinds of swings. Among others, there is a machine with long arms on which dragons, swans, snakes, horses etc. have been made to sit on. This machine turns around, and the people sitting on its arms aim for a ring with lances and thus imitate the knightly jousts of old. Music and dancing as well as other amusements are not lacking either. Certain days have been dedicated to grand celebrations, and then there are fireworks and the like.

The 31st. At Versailles with Lehmann and Hasler to see the play of the fountains. Each fountain is opened with a procession of the local prefect and other public officers; it is richly equipped with pipes and drums and soldiers.

Aug.

The 1st. Visited Waltersdorf. I have found in him a very enlightened and also very courteous man. We took a long walk together along the boulevards, and he told me a great deal about his plans for the improvement of his lands, which I am pleased to listen to although I know nothing about it. When we parted, I went to the panorama, where I saw the one of Naples. So much has been said about pano-

ramas in general that I have nothing to add. I can only say that this one pleased me, but that experts find it much inferior to some of the ones they have seen in London.

The 2nd and 3rd daily business.
The 4th-7th. Walking tour with Lehmann, about which I have written a separate letter to you.

Montmorenci, August 5th 1803

Now I am finally writing to you from another place than Paris, but please note that it is not, as you might first believe, from a place I am passing through on my homeward journey. Although it is near, it is not as near as you think. I still cannot set the day and the hour. This time my journey is only a little walking tour around Paris. The place where I am now will be familiar to you when I tell you that it is Montmorenci, Rousseau's residence, where he wrote the final parts of his *Heloise*. I am convinced that you would like to have a letter from me written in this place. I arrived here last evening in the company of my friend, Dr. Lehmann, after a quite pleasant walk of a few hours' duration, in the cool of the evening. We had driven from Paris to St. Denis, and from there, where nature gradually becomes less bound by the works of man, we walked to the graceful hill at Montmorenci. It was too late to see anything in the evening, but we were up before the sun the next morning and saw it gradually illuminate the beautiful broad valley that surrounds the town, and the mountains and woods and places that adjoin it. It would be a wonderful spectacle to see Paris present itself in the distance from this vantage, but one sees Paris here as elsewhere only as a long stretch of houses without form and without those majestic towers which otherwise proclaim the great city from a distance. After we had walked around the town and enjoyed the beautiful views, we finally caught sight of Rousseau's Eremitage. Seeing it was one of our greatest desires, and this was easily fulfilled; the resident, the famous composer Gretry, gives every traveller entry. One would have to be a great admirer of this undeniably fine man and more enthusiastic about his writings than I have ever been, even immediately after reading them, in short, one would have to be in a highly poetic mood to find any particular interest in seeing this place. Eve-

rything there is completely ordinary, and there is not even a view over the beautiful region. In order to disturb, in every possible way, the feeling that one might have by entering a place where a great man had spread light over the world, one finds a bust of Rousseau, under which the lady who had given him this asylum wrote or had written in verse that R. was more well-spoken than wise, that she regretted that he would not remain there for ever, and that he was ungrateful. In a sense she makes up for this by saying that when she reads his writings, she forgives everything. The very Frenchness of this verse, which I should have copied for the sake of its curiosity, must fill everyone with annoyance. In short, he who wants to enjoy Montmorenci and there remember Rousseau should stand at dawn on the hill of Montmorenci, look out at opulent, wanton, narrow-minded Paris and then turn to the modest house where one of the most deep-feeling and most ingenious of men has lived. There one will feel his true worth and forget his weaknesses; but one does not go to the Eremitage to be reminded of this. Besides, you can easily imagine that the view over a beautiful and gloriously lit valley on a lovely morning can easily be sufficient compensation for a little walking tour, particularly if one has spent 8 months locked up in the Parisian air. Even without this it is wonderful, and the area around Montmorenci is one of the places where I should once like to take my Sophie if unexpected good fortune should enable me to travel more often.

St. Germain, August 6th

After a walk of 2 ½ miles yesterday we arrived at this place, which is on a hill with the Seine flowing at its foot. This route, as well as the 3 hours' walk around Montmorenci which had preceded it, tired me greatly since the day was also warm. To this must be added the Catholic fast, which we poor travellers were forced to observe; when we came to Argenteuil, a small market town, and wanted to eat, the landlord asked us what we would like, I answered immediately, "Whatever you have handy, just some kind of meat." "That is precisely what I cannot give you," he answered, "because today is a fast-day, and nothing has been slaughtered in the town." We had to make do with a pancake and some poor stockfish washed down

with local wine. Here in St. Germain we found a good inn with a beautiful waitress, as swift and nimble as you do not find many waitresses, not even in France. Therefore it was all the more striking to see that her clothes were not particularly clean, but that is not unusual in France. If you came here, you would often find occasion to be surprised by the lack of cleanliness of the French. However, you must not think that I wish to excuse the pretty waitress; on the contrary, because of this flaw she does not deserve my dwelling on her any longer. Thus I shall immediately move on to the machine at Marly. This expensive machine was built under Louis XIV to bring water to Versailles, which that famous king erected against all common[135]

To Professor Manthey:

Paris, August 10th 1803

Since I am very busy at the moment, as I mentioned in my letter to Sophie, I will only write two words to tell you something about the means I have to pay my travel expenses.

Received:	
Royal grant	400 Rd.
5 semi-annual payments of	
Kappel's grant of 270	1350
1 year Ehler's grant	125
In all	1875 Rd.
Remaining:	
1 semi-annual Kappel's grant	270
2 years Ehler's grant	250
Total	2395 Rd.

It is correct that you have received only one year's payment of Ehler's grant, but I shall receive another 125 in Dec. 1803 and finally 125 again in Dec. 1804. According to the charter, one can keep the grant

135. The word "sense" is missing. The letter ends here.

for one year after returning home. Actually, one can have it for 4 years, so it is not impossible that I might receive 125 in 1805, too, but I certainly would not count on that. In your calculation of what I have received from you, you have forgotten to include what I had received before my journey; for the amount I have noted is a few hundred rix-dollars more.

However, you can see from this calculation that my deficit will not be large although it will be bad enough. But I am not uneasy; for your kind offer, from before I began my journey and repeated recently, to advance me what is needed makes me secure for the moment, and I am not concerned about repayment since my father has promised me support if it should prove necessary. If all this had not been present in my mind, I would have arranged my journey according to a different plan which would have been less costly but also less useful. I have not even been willing to count on such long credit as you undoubtedly would extend to me because I have already enjoyed too many proofs of your friendship to become a burden to you if it were not necessary; it is sufficient that you have given me an advance, which will not be repaid in full until more than a year after it was given, without even considering the inconvenience that all the necessary transactions have thus caused you. I write all this only because I believe that I owe you a precise account of everything, and because I do not want you, out of friendship, to think that I had not [sic] neglected considerations that I owed you, and my fiancée, and myself. Here in Paris especially I have not saved on any expense that could serve for my education because I have found that such a saving is the most certain loss. My indisposition has also caused me a number of expenses. Now I am finally well.

I shall write to Jörgensen soon. I must get it into his head that it would create the worst impression among the French scholars if they were to believe that it was not to profit from contact with them and their institutions but to become regular students in Paris that we sent off people who had already been given a public education at the university; for it is one thing to attend lectures and another to be sent off to attend lectures. I can destroy his wretched insistence on formalities with proper legal arguments. It is clear that I shall not overstep the limits of courtesy in dealing with him.

Palladium can be obtained if one mixes a solution of mercury with one of platina and adds a solution of green vitriol to this. Chenevix has not yet found the exact proportions required to make this experiment succeed every time.
Your devoted
Ørsted.

Continuation of the travel journal:

The 8th-13th daily business. Visited Biot, who gave me several of his short treatises.

The 14th. Walked with Lehmann along old and new boulevards. I have never taken this entire walk before, and that is necessary to get the full impression of Paris.

The 15th. Celebration of Bounaparte's birthday. The end of the Concordat and Buonaparte's proclamation to perpetual Consul. The government buildings were illuminated more brilliantly than for the celebration of the Revolution, but the citizens had done even less.

The 16th. National Institute. Cuvier's lecture.

The 17th. Visited Guyton, from whom I received various technical reports which were of interest to me, but I also had a scientific discussion with him that did not leave me with a high regard for his scientific spirit.

The 18th-19th daily business.

The 20th. I saw part of Conti's pencil factory. He keeps it secret, and it was only through a kind of impertinence that Lehmann and I were able to see a small part of it. On closer inspection, we have learned almost everything we desired. All painters agree that the products of this factory are the best they know.

The 21st-31st. I have been occupied almost constantly with Ritter's experiments, which I am to repeat in front of the commission of the National Institute. During these days, I have already repeated the main experiment with Biot, the secretary of the commission, and have been particularly successful with it.

Now I have more or less finished this work, and I can again begin to do the things that are more important for my stay here.

September 1803

The 1st. Today I made a proper tour of Paris, in the company of Legal Councillor Frisch and Lehmann, to see several factories. The first factory we visited was for obtaining oil from ox feet. This factory is remarkable for the careful use that is made of everything. The soft parts of the ox feet are boiled for glue; the bones are boiled until the oil, which is particularly good, is separated; then they are sold to the turners. The horny covering is separated and sold to the comb makers. Thus there is a use for everything. We also visited Fourmi, Paul's factory for medicinal waters, a wallpaper factory, a *fabrique de poëles oeconomiques*, Caron's porcelain factory, and Olivier's faience factory. Fourmi is currently making the same kind of porous vessels as those which have so long been used in Spain, under the name of Alcazarras, for cooling water. It is undeniably simple and could easily be imitated by us if we thought it worth while. Our unglazed pottery often serves the same function. Paul has an exceptionally fine establishment near Tivoli, where he not only makes his aerated waters but also offers baths of every possible kind. In addition to baths in artificial waters, warm baths, steam baths, drip or shower baths, he also has a kind of bath previously unknown to me, that is spray baths, where one can enjoy a bath with a quite costly water at no great expense. Paul himself, a very courteous man, keeps his methods for aerating water secret, but I am quite convinced that there is nothing unknown in it. Otherwise, his method may easily be better than the usual one in which the water is not first freed of its atmospheric air, is not suitably cooled, and where there is no strong compression. *Fabr. de papiers peints* shows only the warehouse, where a kind of paper printed with pulverized cloth was particularly interesting. It had quite the appearance of cloth. It was saturated with a substance that keeps away worms. They would not give any samples because, they said, if someone wanted to imitate it, they should at least buy a piece. *Fabrique de poëles oeconomiques* was not really working and of little interest. Caron's porcelain factory is remarkable for its taste and beauty, as well as for its low prices. This time we only saw the warehouse at Olivier's faience factory.

The 2nd. Experiments and work at home.

On the 3rd I was present at a prize giving at the National Institute. By order of Buonaparte, prizes should be awarded to the best

students from the finest schools and should be presented to them in the presence of the National Institute, some senators and other important officials. The prize consists of books and a wreath which is placed on the winner, but which he quickly removes and carries with him. Chaptal, as Minister of the Interior, presented the prizes, crowned the young students and gave them a brotherly kiss. This also included a couple of young girls who had won the prize for music. The ceremony was opened with a speech by Arnault, a member of the Institute. He described the progress of science in France and presented the men who had distinguished themselves most as models for the young men who had now made such a successful beginning. The speech had many brilliant passages which received much applause, but he declaimed or, rather, read it indifferently. One could clearly see that the author was merely a *belletrist* and therefore judged the merit of all authors only on the basis of their rhetoric, which was why Lavoisier was not even mentioned. The speaker had the pleasure of seeing his own son among those who received the prize. After he had received his reward and the brotherly kiss from the president, he went up to his father on the podium and embraced him. This made a noticeable impression on the father, who had not yet finished naming and calling forth the other students. The scene did not appear to be planned since the son acted only after being urged by others; therefore it made an impression on everyone. It must be regarded as characteristic that there was no year printed on the program for this ceremony, but when the speaker read it, he called it the 4th year in Buonaparte's Consulate and not the 11th year of the Republic. Neither did he say that the prizes were drawn from the nation's coffers, but that they were due to the consular munificence. I also heard that many people were greatly amused that Chaptal was dressed like the old courtiers.

To Professor Manthey:

Paris, September 4th 1803

I am ashamed that I have so long neglected to inform you of Ritter's important discoveries, which have occupied me for some time. I postponed it from one post day to the next in order to have time to

finish the French treatise which I was preparing on the subject. It is now finished, has been submitted to the Institute, and I have already repeated some of the experiments with Biot and later shown them to the galvanic commission of the National Institute, where I hope to make the acquaintance of Laplace the day after tomorrow and perhaps come in closer contact with the other members that I already know. It is rather certain that Ritter will get the galvanic prize of 3,000 francs, and the large prize of 60,000 is perhaps being reserved for him. The foundation of his discovery is old; it lies in the law, discovered by him some years ago, that a body which has been in a given galvanic state while connected to a galvanic circuit or a galvanic battery passes into the opposite state when this connection is removed. If one has constructed a battery only of copper plates and moistened paper, without zinc, it shows no effect at all, but when it has been in contact with a voltaic electric pile for approximately 5 minutes, it will act like one. For while the former is connected to the latter, all the copper plates in it are positive on one side and negative on the other, from which it follows that they become positive where they were previously negative and vice versa when the connection is removed so that they still maintain + on one side and - on the other. The pile of copper and water is thus charged by the electric pile and is the same to this as a Leiden jar is to the electrical machine. Therefore, it can also be called a charged pile. Just as Volta's electric pile, according to Van Marum's experiments, produces more electricity in any given time than Taylor's machine, although this is the largest of all, so can Ritter's charged pile also receive a much greater quantity of electricity than Taylor's electric battery. One of the most remarkable circumstances regarding this charged pile is that, when it consists of only a few plates, the electric battery produces a very strong chemical effect but only weak shocks; if, on the other hand, it is composed of a large number of plates, it gives larger shocks and a weaker chemical effect. If it has 2 or 3 hundred plates, it gives very strong shocks and no chemical effect at all. The theory that ascribes all electrical effects to some fine substance seems no longer to be tenable since one can thus isolate one phenomenon from the other. The charged pile can also be used to intensify the electrical effect if the plates are very wide and the moistened paper quite thick.

This discovery has been accompanied by one that is even more important; it has served to show that the earth has two electrical poles just as well as it has magnetic poles. If the charged pile is placed perpendicular, it assumes through its mere communication with the earth + above and – below. If it makes an angle of 50 to 70° with the horizon, this charge is greatest. If it is horizontal, it receives a charge when it points towards north-northeast or south-southwest but remains inactive if it points towards east or west. The electrical declination from north to south is thus the opposite of the magnetic; the latter goes towards north-northwest and south-southeast, the former towards north-northeast and south-southwest.

The members of the physical division of the National Institute seem to take an active interest in these important discoveries.

I have acquired considerable strength in writing French from my work on Ritter's discoveries, and I hope that it will be useful for me when I want to communicate with French scholars.

I have recently had to ask Görrike for 1200 livres. I almost fear that the bill will arrive before this letter, for I had intended to write to you a week ago about it and have been prevented every day. I must therefore ask your forgiveness.

I have recently seen a porcelain factory near the boulevards under the direction of cit. Caron, successeur des c.c. Lemaire et Josse. It seems to me that the form and the painting of his products are really much better than others, and the prices are relatively inexpensive. I prefer his works for their taste to those I have seen in Sevres. Did this factory exist when you were here? Or do you not think so highly of its products?

Fourcroy and Vauquelin have attempted to prepare palladium but so far without success.

I hope to have more news to report within the week. – I intend to leave Paris in 4 weeks.

I leave the letter to J., the book-keeper, to your judgement.

Forgive my fragmentary style. I am forced to be brief as I have an endless number of letters to write.

With respect and friendship

Ørsted.

Continuation of the travel journal:

On the 4th I performed some of Ritter's experiments for the galvanic commission of the National Institute. As Ritter has not yet provided details about his experiments on the earth's electric poles, and as the commission was particularly interested in their investigation, I had to spend the 5th, 6th, 7th, 8th and 9th performing experiments with Biot and Coulomb as well as on my own. This gave me a better opportunity to get to know Coulomb, whose precise electrical experiments are well known, and I learned a great deal from him about his own experiments in a conversation lasting more than an hour.

On the evening of the 8th there was a prize ceremony at the *ecole polymatique*, which I attended. It was apparent that everything here was an imitation of the prize ceremony at the Institute. The secretary general of the prefecture here replaced the Minister of the Interior and the speaker. He seemed to have made an effort with his speech, but it was extremely meagre and not free from flagrant historical errors. A very large number of students received prizes so that one would think that the school was of some importance, but that is not the case. There are two reasons for awarding prizes to half the school, partly to satisfy the parents and partly to fool the public into believing the school to be quite large. I hear that the same strategy has been used in the big competition for prizes at the National Institute, where they have tried to create a good impression of the revival of the educational system in France.

On the 9th I unexpectedly made the acquaintance of M. C. Bruun, whom I had not wanted to visit. I met him in the street with Captain Rustadt, and after I had spoken a little with him and learned that he is now pursuing geography with diligence and success and discovered that he has very good knowledge in physical geography, I asked him to visit me. He can be still useful if he improves his incorrect political notions.

On the 10th I showed Charles' collection of physical instruments to Legal Councillor Frisch and took him to the National Institute. We dined with Ambassador Dreyer along with Lehmann, Hasler, Rustadt etc. On the way home (Dreyer is staying at Muëtte) Leh-

mann and I had many problems with our coachman, who was drunk. This affair gave us an opportunity to see how the French are willing to interfere in everything. We had hardly asked 3 passing Frenchmen what we should do with such a fellow before they started an argument with him, and they had beaten him black and blue and torn his clothes etc. before we could calm things down. Now he began to shout murder and violence, and some others came immediately and grabbed Lehmann and me by our collars as we were returning to the Ambassador and were already at his gate. Hasler and Rustadt, who were just leaving, were also grabbed, and we would all have been taken before the mayor if Hasler had not managed to tear himself away and inform the Ambassador. However, I must admit that most of them were just as quick to let us go as they had been to grab us. Legal Councillor Frisch later told me that Dreyer had been extremely satisfied with the calmness that Lehmann and I had displayed.

On the 11th-13th I was required once again to perform experiments for the Institute.

On the 14th Lehmann and I had dinner at Guyton's. Biot, Thenard, Desormes, Clement and Poisson were also there. The conversation at table was not very significant although there were some interesting reminiscences of scenes from the Revolution. Among other things, I heard that Guyton had been up in a balloon several times, including once at the Battle of Fleuri. They played chess after dinner. Mme Guyton forced me to play with her in spite of all my protests about my poor insight into this game, and as it then transpired that I played better than Mme Guyton and most of the others in the party, I received excessive praise for my modesty, which she claimed was very Danish. – The most interesting thing about the party was the judgements I heard from Biot, Thenard and Desormes regarding recent literary works. Thenard and Desormes judged philosophy like chemists and moreover like Frenchmen; Biot corrected them. As an example of how works in a science which are written in its infancy are generally more detailed than those which contain it in its more complete state, he mentioned Fourcroy's book in 10 volumes and Berthollet's, which is only 2. So you can see the fate that awaits Fourcroy's long-winded book even in France.

The 15th. Experiments.

The 16th. Visited Biot, Brognard, Guyton. The last of these is the director of the polytechnic school, and therefore he was quite overrun today by those who wanted to register for the coming entrance examination at this school. A man who came to speak for his son urged that the Minister of the Interior was well disposed towards his family and had promised to recommend his son to Guyton. G. answered him very well and said that it would please him to see that this young man had made good progress, but that he dared not recommend him to Biot, who was to examine, because he had got it into his head that anyone who came to an examination with a recommendation must need it. – Today I also attended a public meeting of the *société d'agriculture*, where prizes were awarded, and some papers and reports were read. The best in my opinion was a report on Olivier de Serres, the author of the *théatre d'agriculture*, one of the contemporaries of Henri IV. The author of this report, François de Neufchateau, had made a very successful translation of an old Latin poem, which is at the beginning of Olivier's book. –

To Professor Manthey:[136]

Paris, October 6th 1803

My departure is being delayed more than I had expected. However, I hope that within 3 weeks I shall leave this remarkable city, which only now that I am getting to know it and its scholars better is as useful to me as it should be. I have recently seen many porcelain, faience and pottery factories. However, I doubt that I have any important news for you; for although I have seen all the factories which I have heard about, I have not been able to acquire more than a detailed theoretical knowledge about them as I have not had any previous practical experience of them. I have registered all the reports I have been able to gather. I have developed a kind of preference for pottery and would like to make a contribution to its improvement at home if I could. On my journey to Copenhagen, I am

136. The remainder of the letters from this journey, with the exception of the last, were addressed to Manthey.

thinking about staying for a few days in market towns here and there in order to see what is done with regard to my favourite manufacture and others. This should be useful for me in the future. I suspect that the material which is used for our so-called Jutland pottery can also be used for Wedgwood ware. Do you have any reports about this? If you have had the opportunity to investigate this subject, your advice would undoubtedly be of the greatest use to me. On the same journey, I also intend to gather more information about the state of our provincial apothecaries. This is to some extent an official obligation. I think that I could contribute to their improvement.

Although I have attempted to acquaint myself with the applications of chemistry everywhere, I hope that I shall never get a position in my country which will impose upon me the duties of a practician; for in truth I am not and never shall be fit for it. Theoretical and truly experimental chemistry and physics have fascinated me since childhood, and all my efforts have been in this direction without my knowing it. Moreover, this study has never offered greater interest than now that everywhere we can anticipate a more vigourous rebirth of physics than we have ever seen before in history. If I could wish for something other than a complete transformation, I would take Berthollet as my model because he, **as a genuine theorist**, has still enriched his country with discoveries that are of importance in factories and industries. You can easily see from this that I would prefer not to begin my career at home with something that is merely **technical**, with which I would surely have the hope of a more brilliant success but not of a life consistent with my ideas. Independently of all this, I will bring with me all the technical things that I can from Paris. – What I would really like to do is to write a new Danish pharmacopoeia, if that task were given to me. Tode already spoke to me about this before I left. Not only would the experience of others come to my aid, but I also have some major improvements that have not been considered elsewhere. It is obvious that I would not embark on such an important thing without closer consultation with my wise teacher and friend, whose more mature experience so often guides me. – Another way for me in the most proper sense to open my career at home would be lectures on elec-

tricity and galvanism. I am quite confident that I am stronger in this than anyone else at home **at the moment**. If I set a fairly high price on such lectures and addressed them to the better classes, it might be a success. More about this when we speak.

Descotiles, Fourcroy and Vauquelin have discovered a new metal in raw platina, and one suspects that palladium will give rise to many discussions. I know very little about this metal, but it is a noble metal and very much resembles the supposed palladium.

Thenard has discovered a new blue dye, which is close to ultramarine. It consists of cobalt phosphate and arsenate and of alum earth. It can also be used on porcelain. The Minister of the Interior immediately sent him 2000# as a reward and as support for the continuation of his important work. In addition, he will be granted all possible advantages if he wishes to establish a factory for this.

[Added in the margin:] I have only heard a few words about these two things at the National Institute, so it is possible that some of this is incorrect although I do not think so. I shall tell you more about it when I am better informed. Haüy has now published his physics book, which he wrote in 6 months under orders from the First Consul. I had expected much more from it; it is quite mediocre. He has tried to separate everything that is chemical and mathematical from physics, which has the natural consequence that this science becomes a collection of fragments and not a science of the laws of nature. In my opinion, physics must be divided into the mechanical and the dynamical, and chemistry must be in the latter part to the extent that it is science. The use of this is art or profession as is that of mechanics. Haüy has mentioned me at one point with distinction for an observation I made to him.

I am also mentioned with distinction in Biot's report to the National Institute on galvanism, although this does not really mean anything.

Lehmann sends his regards; he is staying with me, and we shall leave Paris together in order to go to Francfurt, where we shall part. He is going to Göttingen, and I down the Rhine to Holland, which I intend to traverse in a period of 4 or 5 weeks, and then I shall go to Bremen and Hamburg. There I shall again meet Lehmann, who will show me much in Hamburg which was previously unknown to

me. I then intend to travel by land, as they say, to Copenhagen so that I shall have the opportunity en route to visit some market towns as mentioned above. Thus, it will be at least 3 months before I come home. As it is undoubtedly more advantageous to receive the money which I shall need for my journey in Frankfurt rather than in Paris, I ask you to arrange for a letter of credit with some establishment there. I shall very soon send you my itinerary. I am not sending it today because I have not had the peace of mind needed to write a draft of it because of a letter that my brother has written about S.P. You must surely know its contents and will hear my response from him. I have nothing to add to what I have said there. I have now been awakened most violently from a contentment, from which various hints, which I only understand now, should already have awakened me. Dr. Lehmann asks if he can be of any service to you on the route he is to take.

Your commissions have been performed in part; I am performing the remainder now.

You show me your friendship so many times that I cannot thank you for each and everyone of them. It is only the smallest part of my obligation to remain for ever with gratitude and friendship your Ørsted.

Paris, October 10th 1803

I had previously planned to travel with my friend Lehmann to Frankfurt and from there by the Rhine to Holland. Although this route is longer, it is also more interesting. However, more careful considerations now suggest that I should change my plans due to the recent events. The season has already advanced more than I would have wanted with me still in Paris, and I shall be here for a few more weeks. In order to avoid travelling in Holland in the middle of winter, I shall have to take the shortest route there. I shall thus travel via Brussels, Antwerp, Rotterdam, Haag, Leyden, Harlem, Amsterdam. It is easy to foresee that this journey will take about 4 weeks, but it has not yet been decided how long I shall stay in each place. If, as I expect, I leave Paris at the beginning of November, letters could be sent to Brussels for my arrival on the 6th, to Antwerp on the 8th, to Rotterdam on the 10th. I shall probably

arrive at these places somewhat later, but it is obviously safer for the letters to come before my arrival than after my departure. Regarding a letter of credit, it would perhaps be safest to send one to me in Rotterdam. If you decide otherwise, I should like to be informed while I am still in Paris, which can be done by my brother if your many affairs prevent you. I need hardly say that letters of introduction to Dutch scholars would be most welcome to me.

You will surely receive your books and linen from Görrike along with my things.

Yesterday I went to see Regnier, who asked me to send you his compliments and assure you of his high regard. When I saw that he remembered you so vividly, I also told him that you had instructed me to pay him a thousand compliments. He will send you a drawing of a fire ladder that he has invented, which is very good if you are not familiar with it already. – However, he will also send you a copy for the Crown Prince, which I have not been able to prevent. You know the situation best and can tell if it is worth delivering this to the Crown Prince, or if perhaps he does not already know this device. When he makes a model of his fire ladder for a prince, he expects to be paid 3 or 4000# as if it had been made full size. This for your information.

Today I must limit myself to the greatest brevity. Be well and receive the renewed assurance of my
Respect and devotion
Ørsted.

Paris, October 30th 1803

The reason why I am writing to you today is that Biot has asked me to get him samples of stones which may have fallen from the sky in Denmark. In Bartholin's writings, 4th volume[137], he has found a description of some which had fallen on Funen at that time. Bartholin had obtained one sample, the King the other, of what had been brought to Copenhagen. Biot particularly wished to have a sample of these. In return, he offers to send others which have been col-

137. This reference is presumably to Thomas Bartholin, *Historarium anatomicarum rariorum centuria* I-VI, Copenhagen (1654-61).

lected here in France. As he will publish a treatise on this subject within the next few months, he would like to have everything relevant sent to him by post unpaid. I do not know if the connection you could establish with the mathematician Biot by doing this would be of sufficient interest to you. I know even less whether you have the time to get involved in such a tedious enquiry. This is the reason why I have enclosed a letter to Prof. Vad. His position undoubtedly makes it easier for him to find out where Bartholin's minerals have gone, and whether it is at all possible to find them. If you should happen to know something about this yourself and knew how to get a sample, it would obviously be unnecessary to give Vad this letter, which I have written not without some embarrassment as I have not previously had any correspondence with him.

[Added in the margin:] Biot's address is *Mr. Biot, membre de l'institut national, rue de franc bourgois.*

Vauquelin has recently read a treatise at the Institute on apatite and claims that Trommsdorff's apatite is nothing more than phosphate of lime. What I found lacking in this treatise was a thorough comparison between the properties of phosphate of lime and the phenomena which Trommsdorff and Richter have observed in apatite. Nor have I been able to obtain more information orally from Vauquelin. It thus remains doubtful that they have investigated the same mineral; for it seems somewhat strange to me that Richter would have combined acids with phosphate of lime, then, with the intention of driving off the water of crystallization, heated his salts to glowing until they had lost all acid, and still given the quantitative relation. However, this is how Vauquelin imagines things. As you know, Richter has previously investigated phosphate of lime stoichiometrically (you are aware that it was considered to be a separate earth under the name of bone ash), so it would be a strange error if he did not recognize it again. It is only the different proportions in which the constituents of this salt appear which still permit doubt. Is Thenard's new blue dye, about which I wrote recently, not the same as Richter's blue carmine? I do not have Richter's *üb. d. neuere Gegenst.*[138] at hand, but I recall that this is described in the first number.

138. *Ueber die neuern Gegenstände der Chymie*, 11 vols. (1791-1802).

I expect to leave Paris in a little more than a week, so you should not expect another letter from here. You can easily guess why I am no longer sending my journal.
With respect and friendship
H. C. Ørsted

Rotterdam, November 25th 1803

Perhaps you did not expect a letter from me so soon written from this place. Circumstances have caused this haste. A countryman, Mr. Wolffhagen from Holstein, wished to travel through Holland in my company and I in his, and this, along with the fact that I can save some money by having a travelling companion, made up my mind. Since I could not be certain of finding a letter of credit in Rotterdam, and since I had not yet received an answer to the letter in which I asked for one, I allowed myself to ask Consul Classen for a letter of credit in Rotterdam. After having ascertained that there was no letter from you here, I have used this letter of credit to obtain 100 Dutch ducats, which sum is the last I shall draw during my journey.

As I have not felt called upon to send my journal for some time, I would like to tell you something about my experiences during the last days in Paris. I have spoken at length with Thenard regarding his blue dye. He has given me samples of it and has promised to mention its application in the manufacture of porcelain in his treatise, which will soon be published in *Annales de Chimie*. I have often visited Guyton and stand in the good graces of his elderly wife. I have good relations with Haüy as well. He has given me a copy of his physics book for you. I have also become acquainted with Delametherie recently as I have delivered my French report on Ritter's experiments for his journal. You yourself know D., who is undeniably a man of talent but a true Frenchman in everything regarding philosophy. He has given me his two-volume book on natural philosophy[139] in order to convert me to his long-discredited theory. – The most remarkable thing about my entire stay in Paris was that I made Fourcroy's acquaintance on the last day. The occasion for this

139. *Essai sur les principes de la philosophie naturelle* (1787).

was that Fourcroy at a party had told our Ambassador that he would like me to visit him. I learned of this only when I came to pay a farewell visit to the latter, so there was nothing to do but visit this arrogant charlatan on my last day in Paris since Dreyer seemed to take an interest in it. He received me much as a minister receives a client and seemed to do everything he could to discountenance me; but fortunately, I had anticipated this, so he had only indifferent success. It was of particular importance for him to tell me that he believed that chemistry was in a better state in France than in Denmark. I certainly did not agree with him; I answered that this was not strictly correct since we were as familiar with chemical theory as they were in France, and I added that Scandinavian chemists read his *systeme de connaissances*[140] as well and easily as the French; but I explained further that what is special about Paris is that there are far more people who understand the **practice** of chemistry as a consequence of the many chemical schools here, which I hope there will soon be no lack of in our country. In order to clarify the relations in which he thought we stood, he said, "I recommend you to send us minerals often". To this I responded that I had the honour of knowing the estimable Haüy quite well, and that I would certainly not neglect to inform him of whatever I might find of interest. You can appreciate our conversation from this sample. I attempted to remain polite, even courteous; but I was not so submissive as the honourable minister is used to in his French clients with the result that one of his secretaries, who was present, watched me very attentively. Fourcroy ended with greater courtesy than he began. He assured me that I spoke quite excellent French, and that he had generally observed that Danes spoke this language with greater clarity and precision than the Swedes. He concluded by recommending that I remember the French chemists, which I found better than recommending that I send them minerals. I hope that it does not surprise you that I have thus neglected Fourcroy. I could expect nothing from his acquaintance at a time when he is more engaged in affairs of state than scholarly work and moreover requires the most unconditional agreement in everything he says. I have heard that he has insulted his colleagues in the Na-

140. *Système des connaissances chimiques* (1801).

tional Institute because they disagreed with him about matters in which he had no voice, e.g. about agriculture. Tessier once had a disagreement with Fourcroy about a submitted treatise dealing with fires in grain and referred to the results of ten years of his own experiments, whereupon Fourcroy answered most impolitely that he did not believe it; *ex hoc uno nosce omnes*[141].

Dreyer has recently been extremely courteous to me and took leave of me in such a cordial manner that it surprised me. Guillomo has also been extremely courteous. You can easily imagine that I have visited Görrike regularly. His open integrity and his cheerful humour naturally make him the friend of many. He sends you many regards. I have been at Classen's several times, at Carstenson's once by invitation. It was one of the last days I was in Paris.

I have had several conversations with Fourmis, whose content I would tell you here, were I not soon coming home. The same applies to what I have seen at Caron and Diel, at the factory in Sevres, etc.

In order to avoid tiring you with all of my farewell visits and work in Paris, with my journey and the like, I shall proceed directly to Brussels, where a letter from Gregoire gained me easy access to van Mons. He received me with such forthcoming friendliness that I cannot be other than extremely satisfied. He knows the German literature better than any other French scholar and even knew of my small galvanic works, about which he spoke in a manner which I must ascribe to his complaisance. I had to give him a report on Ritter's latest discoveries. He remembers you with much respect and sends his regards. – In Brussels I have also become acquainted with our Danish Consul West, who is distinguished by his interest in painting and his amiable conviviality. He is establishing a small collection of masterpieces of the art of painting, which he intends to show publicly upon his return home. A hermit by **Rembrandt** and a Venus by Floris stand out in this collection. The head in the latter is the most beautiful I have seen. That parts of Brussels are exceptionally beautiful, that *place de la liberté*, previously *place royale*, is a masterpiece of architectural symmetry, that the theatre in Brussels is not bad, I hardly need to tell you, who have been there yourself.

141. From this one example, you shall know them all.

You have presumably also seen the art gallery, which contains many fine things by the Dutch masters in so far as the French have been willing to spare it. I find the rooms even more beautiful than those of the museum in Paris. The poor weather gave me little opportunity to see the region around Brussels, which is undoubtedly beautiful in summer. The collection of physical instruments is not of much significance and is no longer used as the central school, to which it belonged, has been closed. They are creating a *Lycée* there, but that does not appear to be very successful.

The entire day of November 20th was spent travelling to Antwerp in a Dutch stagecoach containing 12 people. The whole device is intended for Dutch constitutions; for in the evening my travelling companion and I were more exhausted, indeed quite dazed, from this little trip than from the entire journey from Paris to Brussels. I brought with me to Antwerp two letters of introduction from Gregoire; one to the Prefect and the other to Customs Director Blutel. The latter showed me great courtesy and had his son take me to all the art galleries there. Among the many excellent pieces, I saw the picture of miserliness in the form of an old woman; it was for sale at 60 *Louis d'or*, a painting by Rubens depicting Faunus finding Ceres, for which they wanted 600 *Louis d'or*. The former pleased me most, because of its expression and the master's well-known clair-obscure. It is remarkable how the few Italian pieces in all Dutch collections attract anyone who has not been distracted by looking more at the details than at the main idea; some paintings by Guido Rheni, among them a Magdalena, particularly attracted me. A description of this picture would be in vain, I can only tell you an observation which is probably not new to you, but which still merits being written down. The penitent in this picture has a book in front of her, which, from a distance of a few feet, is most strikingly realistic, but which has been created by a few strokes of the brush; Rembrandt's hermit, which I saw at West's, also has a book in front of him, but there you can read a few chapters of the Bible if you have a microscope. This is at least a good example of Dutch precision.

In the evening, at dinner I should say, I ate at Blutel's and then visited the playhouse, about which little can be said as it was neither very good nor very bad. On the 23rd the young Blutel fetched me

and my travelling party so that we and a young Spaniard could see the other sights in the city, but we were not very fortunate today; we found no-one at home and could not get to see the mayor's picture gallery, which is supposed to be excellent. We saw the city hall and there a painting which depicts Bounaparte, surrounded by all sorts of allegorical figures. It is by a young Dutch painter, currently in Paris at the request of the Consul, but it is painted entirely in the French style and has nothing of the beautiful palette of the Dutch.

I spent the 23rd and 24th travelling from Antwerp to Rotterdam via Breda. I have never had a worse journey; at first the stagecoach was a *ci-devant* coach, which had been converted into a stagecoach for 9 people. You can easily imagine the air in such a closed carriage. A half-grown boy, who was otherwise used to hardships, fell ill, and many of the passengers found it wiser to walk, although it rained on and off, rather than to remain in that space. I numbered among the latter. At dinner time we changed coaches, and we got one in which it was not possible to sit upright, but in which there was certainly air from all sides. Therefore it is good that one does not travel at night with this coach but spends the night in Breda. The journey from Breda to Rotterdam is not so bad as the one from Antwerp to Breda. I had the opportunity to observe the country through which we were travelling and my fellow travellers. They were quite eccentric. A Dutch theatre director naturally played the principal part. He took great pains to explain his art to a French officer, but he knew so little French that it proved to be extremely difficult. It did emerge that money is the main thing, and that this is used to live well. A sensible theatre director, that is to say a travelling one, must know how to favour officers so that they lend him swords, hats, soldiers, etc. The public must pay for it all. Of all the passengers, I would have liked to become more closely acquainted with a French merchant, who spoke knowledgeably about most things without saying enough that one could completely judge him. On several occasions he also showed generosity, sympathy, courage and other non-French virtues.

We did not get to see very much here in Rotterdam. Classen's introductions were of little help so that it was almost impossible to gain admission to the factories here. We tried to get into several

places, but on the whole we saw nothing. We saw a church here where we had the pleasure of observing the prudence of the Dutch; when we wanted to leave through the door, our guide stood in front of us and asked us to pay before he opened the door. We had the same experience when crossing the Mardyk. When we had almost reached our destination, the skipper declared that he would not take us ashore until we had paid. And that was even with the public mail. We have since experienced the same thing at other crossings.

Leyden, Decemb. 3rd 1803
On the 26th we travelled to Delft. We were so fortunate that we finished there in a few hours. I immediately found van Bemelen at home. He is one of those people with whom one cannot get very far, but who still shows every courtesy. He showed me a collection of physical instruments which had everything required, but where I really did not see anything new. Then he took me to Canzius's well-known factory for physical instruments, the most complete I have seen. Unfortunately, I did not find Canzius himself at home so that I could not fully learn the prices, which is of importance in comparing the mercantile conditions of the various artisans. I saw the factory from one end to the other; but it is clear that seeing a factory of this sort is little more than seeing its organisation, from which one can more or less draw conclusions about the accuracy of their work. I believe that neither solidity nor the necessary accuracy is wanting there. The external elegance, on the other hand, was not very good, but still better than what is to be found in the work of Dumoutier and sufficient for a mere naturalist not interested in show. Van Bemelen is publishing a Dutch physics book, which will comprise approximately 6 volumes.

Delft is very rich in monuments for famous men. There are two churches where one can see the graves of Hugo Grotius, Leuwenhoek, Cornelius de With, Admiral Trump, a Prince of Orange. One sees numerous memorials in Holland for the many great men whom this little country has produced. Above, I have forgotten to mention the statue of Desiderius Erasmus in Rotterdam, the town of his birth. Perhaps you have also seen it. It inspired me with the respect which that great man of the renaissance deserves.

In the evening we went by canal barge from Delft to Haag, where we arrived in time to see the French playhouse. We found here a good deal of Dutch patience with the actors' mistakes so that several blunders were forgiven which would not be tolerated in France. That the troupe here is not among the worst is probably due to the large number of foreigners and diplomats who live here.

The 27th was a Sunday. Therefore we visited some churches. In the Dutch churches, men keep their hats on. I was quite surprised by this as the Dutch have been strong theologians and thus must have read in Paul that men must not attend services covered or women uncovered. As most churches here are reformed, one sees very little splendour there. We soon became bored with the churches and drove to Scheweningen, where we could see the majestic North Sea. After two and a half years of living on solid ground, it was new for me in a certain sense, and even more so because the view there is very wide and reveals nothing but the heaving sea and ships. I vividly recalled Ewald's "You, Danish road to praise and power, dark-rolling wave" etc. Another thing that interested me in Haag, or rather in the vicinity of Haag, was a former country seat called *maison de bois*, in which hang many paintings related to the history of Holland. This republic has undeniably been richer in great and remarkable men than many larger ones. I saw there a portrait of Erasmus, which was much like the statue I had seen in Rotterdam. Hugo Grotius' portrait was also to be found here as well as that of the patriotic Olden Barneweld. I also saw with particular interest the portraits of Jean and Cornelius de With, known for their patriotism and for the shameful manner in which the mob of the Orange party executed them. A capable painter has painted the end of this scene of horror with the accuracy customary here. It is so barbaric that they have seen fit to hang a curtain in front of it. I engaged all the more in this scene as I, albeit distantly, can regard these men as my family since my father's mother was one of them. In the picture gallery itself one also finds an allegorical painting by a famous animal painter, which depicts Jean de With as a swan, larger than life, covering Holland with its wings. The pictures here have been collected only recently as the French had removed those that were here before. A few Italians and a not insignificant number of good Dutch

masters have made a start, and they collect more every day. Something that the French could not remove is a hall which a princess of Orange has had decorated in memory of her husband. It is a kind of apotheosis. The Prince is depicted in a series of historical and allegorical paintings from his birth to his death. Several famous painters, especially Jordans, have worked on it. When the weather is clear, and they just let the light fall in from the cupola, the illumination is said to be magnificent. The weather was not so favourable to us. A hall with curiosities from Dutch history appeared insignificant to me. The Japanese Hall, which contains genuine Japanese and Chinese works, is one of the most splendid of its kind and exceptionally complete. Naturally, this can only be regarded as a rarity, but it has cost a few hundred thousand guilders, they say. At the table d'hôte I made the acquaintance a young Dutchman by the name of Nolst, who spoke with much passion about his country's literature. He was extremely well informed and very good company. He gave me an introduction to the astronomer Fas in Leyden.

On the 28th I travelled to Leyden, where I met Fas in the evening, but no-one else was at home. F. gave me a copy of a short treatise for Bugge and one for myself. On the 29th I first met Brugmanns, to whom van Mons had given me a letter. B. is my kind of a fellow, full of life and without pretence. Within 10 minutes we were so familiar that he told me how I had to deal with the other scholars here in order to profit from them. Among other things, he took me to Sandifort, who is the director of the late Albinus' anatomical collection. You have undoubtedly also seen this collection, which must even be of interest to non-anatomists because of the beauty of its specimens. They have a fluid for the preservation of specimens which is kept secret. It has not been necessary to renew it for the last 30 years. The collection of physical instruments, which van der Eck showed me, is insignificant, and the professor was not one of the best informed primarily regarding recent literature. On the 30th I went to Haag again in order to see the large pharmaceutical warehouse and the associated factory, all of which is under Brugmanns' supervision and was shown to me with great care as I had a letter from him.

On Dec. 1st Brugmanns showed me his collection, which is so rich and so well appointed that it deserves admiration. It is one of

the most beautiful I have seen of its kind. I promised to send him Scandinavian skulls for his collection.

I do not remember if I have sent you a receipt for the Cappel grant, so I enclose one here. – If the linen etc. which I have brought for you from Paris is contraband, I ask you to make arrangements about it. I have sent it in a box to Höber & Comp. in Hamb. The same box contains my books and some porcelain samples for you from Fourmi.

I shall surely be in Hamburg before Dec. 20th.
Your devoted friend
Örsted.

December 1803
[Added in the margin:] If you do not have the time to read this letter immediately upon receipt, I ask you to note the end, where I request a small letter of credit for Hamburg.

On Decemb. 1st we travelled to Harlem, where I was so fortunate as to find Professor Mattiæ at home the same evening. He took me immediately to van Marum, with whom I had a long conversation about Ritter's latest experiments. Van Marum is no friend of Ritter and is particularly unhappy about his obscure language. However, he engaged in conversation on this topic, and we agreed to spend a couple of days together in order to repeat Ritter's experiments. As v. M. did not have time for this the following day, it was agreed that I should first spend a few days in Amsterdam and then come back to Harlem. Therefore, I went to Amsterdam the following day in the company of my countryman and Mattiæ. The latter gained us admission to a concert held at *felix meritis*[142], where we spent the evening. You yourself have probably seen this society's splendid concert hall, which is distinguished by its size and shape. On the 3rd I visited Rabeholm, a countryman to whom Hasler had given me an introduction. He is a former Copenhagen student, who has devoted himself to trade, and who is currently at an office which bears the name of Weddike & Wendel, whose principal is of Danish

142. *Happy through Merit*, a Dutch society for the promotion of art and science.

extraction. Mattiæ took me to Dr. Richter, son of the famous professor in Göttingen. He, whom I have also met in Paris, took Wolfhagen and me to the *Amsterdam Huis*, a kind of club. Together we also saw the Amsterdam city hall, this large and beautiful building which rests on 11,000 heavy piles, and which, with its richness and magnificence, gives an idea of Amsterdam's former wealth. In the company of Mattiæ I also visited the estimable van Schwinden, who had little time to spare today, but who asked me to visit him again. In the few minutes of conversation we had, I already caught a glimpse of the man whose philosophical vision elevates him above almost all his contemporary scholars. I found his antipode in Lawerenburg, whom I visited in the company of Mattiæ. In him, one would certainly look in vain for van Schwinden's liberality and all-encompassing vision. Our conversation was also somewhat difficult because Lawerenburg cannot speak proper German or French. We had to manage with my speaking French very slowly and distinctly and Lawerenburg's answering me in Dutch. When we did not quite understand one another, Mattiæ served as interpreter. Finally, I also visited Dr. Deimann, with whom I had only a few minutes of conversation, but whereby I began an interesting acquaintance. In the evening I went with Rabeholm and Wolfhagen to the playhouse, where we saw a Dutch opera. One cannot deny the Dutch language a certain euphony which may well be better suited for singing than German although it bears no comparison in a philosophical or aesthetic context. It is highly unnatural, in my opinion, that the Dutch try to be more like the French than like the Germans. They so copied the French that I thought I was in a Parisian opera or listening to pupils from a Parisian theatre. The ballet was not bad. After the playhouse, we went to *het Rondeel*, a kind of dance hall. It is characteristic that no respectable people dance with the women who appear there, but that all the dancers there are hired, and almost all Jews. There is a noticeable difference between an Amsterdam and a Parisian prostitute with regard to their dresses and conduct. They are not nearly so insistent as the Parisian ones. We ended this long day by visiting *Nathuis*, where one can get all kinds of refreshments all night long at a rather high price. If they had such a place in Paris, it would be more elegant.

On the 4th we went to the city hall with Rabeholm and in the evening to a concert at the playhouse. There I met the Danish Consul Dull, who fears nothing so much as being of service to Danes. I learned from him that a brother of Prof. Rahbek from Copenhagen is staying in Amsterdam and is in his office.

On the 5th I travelled back to Harlem and visited van Marum that very evening.

On the 6th and 7th I performed Ritter's experiments with the charged pile in van Marum's presence. They were extremely successful and convinced the doubting van Marum, whose love of truth deserves all praise. Wolfhagen, Mattiæ, a merchant **van Dyk** from Amsterdam, and a wine merchant Jungeling were also present.

On the 8th v. M. showed us Theyler's museum, and we made an experiment with the improved electrical machine, which has an extraordinary effect compared to its size. The natural history collection which belongs to Theiler's institution is extremely beautiful, and the minerals in particular are well displayed and beautifully chosen. At the moment v. M. is more occupied with mineralogy than with physics, and he has arranged the collection according to Haüy. He also has a collection arranged according to Werner. We ate dinner at van Marum's and returned to Amsterdam in the evening.

On the 9th I visited Rahbek, saw the stock exchange, and otherwise wasted time with fruitless enquiries.

On the 10th Rabeholm took us to the building belonging to the *felix meritis* society. This society can roughly be compared with the Athenaeum in France, except that it has a broader and also more patriotic goal as they are also concerned with the education of young merchants, artists etc. They have collections of physical instruments, of plaster casts of antiquities etc. In the evening we saw a Dutch tragedy called *die Belegung von Formosa*[143]. The play and the acting were much in the French style and did not even meet the few artistic demands one usually makes on these. Today I had a long and, for me, quite interesting conversation with van Schwinden, es-

143. *Anthonius Hambroek, or the Siege of Formosa* (1775), a tragedy by Joannes Nomsz (1738-1803).

pecially about the present state of science. His judgements are made with a spiritual liberality which I have rarely found in scholars so old. I was fortunate to agree with him about several ideas, and that led to an intimacy between us that is not otherwise easily obtained. As a memento, he gave me an article by the famous **Knight**, who has performed so many magnetic experiments. Knight had given it to Camper, Camper to van Schwinden. Among several old dissertations, he showed me one which had been given in Leyden during the 6th decade of the 18th century regarding the volume changes which result from the union of different metals, a treatise which is said to contain things that are still not well-known. V. S. sends warm regards, he remembers you with the greatest esteem.

On the 11th I went with Wolfhagen and Rabeholm to Zardam, where the Russian Tsar Peter I[144] has worked at the shipyard. We saw the house where this great man had lived, a wretched wooden hut furnished for a simple worker. This place is especially famous for its cleanliness and for its typically Dutch character. As it was Sunday, we had ample opportunity to see examples of this. We went to the churches and saw young girls dressed in the costumes of their grandmothers with a lot of gold, which is otherwise not used for ornaments any longer. It is very difficult to visit these houses. Fortunately, Rabeholm knew one of the inhabitants and took us to him. It would be too much to describe all the elegance which prevails there; I can only say that by the door there are white napkins, on which one has to step before entering the sitting room in order to show that there is no trace of dirt on one's feet. The streets of the town are all paved with bricks and scrubbed frequently.

On the 12th I was invited to coffee with Deimann, who seemed more superficial than I had expected. Today I also visited a navigation school where young sailors are educated. Everything is nautically furnished; they sleep in hammocks, which they take care of themselves, they eat sea-fare from wooden plates etc. It appears that the pupils there are well trained and well taught. I also saw the botanical gardens today but without much profit due to the season.

144. Tsar Peter the Great (1672-1725) worked for several years in Holland in order to learn ship-building.

On the 13th I visited Dorniner with an introduction from Weddike, but I could not get permission to see his factories; he would only allow me to see his porcelain factory, whose products I found quite indifferent. I made use of this permission as well as time would permit and left for Narden the same evening by canal barge. As the ordinary mail coach travels by neither the shortest nor the most comfortable route, as, moreover, we were two, and the weather made it extremely tiring to travel at night, we decided to take a hired coach. We gained little by this decision. On the first day it took from 6 o'clock in the morning until midnight to go 8 miles, and we did not even manage that much on the following days. On the final two days, the 17th and 18th of December, we had to endure a sharp north wind in an open carriage; my face was quite swollen as a result. It was impossible, by means of tips or otherwise, to get the sluggish coachmen to drive more than half a mile per hour, which is known there as the **Stunde halten**[145]. On the evening of the 18th we arrived in Bremen

On the 19th I made the acquaintance of Dr. Heinecken and Dr. Treviranus. In the latter, in particular, I found a particularly interesting man. I conversed with him a good deal about animal magnetism, about which he told me some interesting observations. His description of manipulation removes all its mystery and makes it really suitable for physical investigation.

On the 20th and 21st I made the acquaintance of several others, primarily Dr. Olbers. This remarkable man works more and sleeps less than anyone else I know. He has a large practice, which requires him to leave each morning at 8 o'clock, he gives parties or goes out in the evening, he makes astronomical observations at night, and still he looks healthy and strong. I also hear that he has many children. A certain Dr. Pahlenstädt, of Wolfhagen's acquaintance, took us to the *Ratskeller*, where it is regarded as a favour to taste the best wines. The main attraction is an exceptionally old Rhine wine. The most expensive is kept in a part called the Rose, the second best in a part called the 12 Apostles after its 12 ox-heads. The Duke of York and other English officers often visited this place when they were in

145. Keeping time.

the vicinity of Bremen. Another friend of Wolfhagen, a Dr. Dehlshausen, took us to the most elegant club here, which is called *die Erholung*. I was only there for a short time and thus did not have the opportunity to see more than part of this quite beautiful place. I went with Dr. Treviranus to the local museum, an institute that is very similar to the Athenaeum in Paris, but which seems to be broader. They have a collection of natural rarities, which is not bad, and a collection of physical instruments including plates of excellent size for a voltaic apparatus. Several of the city's scholars give lectures there. I spent my last evening in Bremen at Dr. Heineckens's, where several friends of natural science had been invited. Among them was a Prof. Martens, who is said to be an excellent botanist. Like many other scholars, he complained about the negligence of the scholars in Copenhagen in writing. He was particularly dissatisfied with Prof. Wahl, whom he himself seems to have offended by making paradoxical statements.

On the 22nd I left Bremen in the company of Wolfhagen and a Dr. Lorent from Hamburg and arrived in Haarburg on the evening of the 23rd. On the 24th we crossed the Elbe, half on ice and half in an iceboat. The crossing was lengthy, and we did not arrive in Hamburg until dinner time. I went immediately to call on Dr. Lehmann, whom I expected to meet here, but to my disappointment he had not yet arrived.

On the 25 I visited Canon Meyer, to whom Gregoire had given me a letter; in the evening he took me to the Harmony, a club where there was a beautiful concert. A Demoiselle Lacroix, from the French theatre, distinguished herself with her beautiful voice, and a Mr. Romberg with his strength on the cello.

On the 26th I visited Mr. von Eyben, the Danish ambassador here, as I knew that he wanted me, as a travelling Dane, to come to him. I was there later for dinner with a *Conferenzraad* v. Qvalen, Legal Councillor Albrecht, two officers v. Qvalen and some ladies. I heard many contemptuous and foolish judgements of the Danish language from the Ambassador's wife. It is unpleasant to hear how most people in Holstein fail to regard Denmark as their fatherland and miss no opportunity to show their hatred for everything Danish. Lehmann has the good idea that everyone who wants to be a

public servant in Holstein should learn Danish, and that everyone who wants to be employed in Denmark should learn German. This would undoubtedly draw both nations closer together. Today I also paid a visit to Schmeisser and received the most courteous reception. He seemed to be very satisfied with my treatise on Winterl, which was perhaps merely complaisance. In any event, I have reason to be satisfied that he has promised me so much of his time while I am here. Tomorrow morning I shall visit him and have dinner with him.

I intend to remain here for another week, or rather until I receive a letter from you; for I need more money in order to travel to Copenhagen. I would be much obliged if you would commission Höber & Comp. to pay me what I need, up to 150 Rd, mostly in Danish currency. You will undoubtedly be surprised that I need money again so soon after having received 100 ducats. I must therefore tell you that Wolfhagen in Paris lent me about 500 livres, which I would otherwise have had to borrow elsewhere, and I repaid him in Rotterdam. I still have a little left but not enough to pay for my stay here and to travel to Copenhagen by the route which I have previously described to you. According to my calculation, this new advance will bring my debt to you to more than 300 Rd, even when all my grants have fallen due. I should think it not impossible to receive this sum from the royal coffers upon my return; if not, I hope to get it from my father and my family, for taking advantage of the longer credit that you offer me would truly be an abuse of your friendship.

Although I do not anticipate the most pleasant affairs when I return, it will still be a pleasure to meet with you soon and in your company develop and test my ideas and, maybe often in your company, work for the good of science or of my country. At the moment I am working in my spare time on a treatise on the incompleteness of our present chemical knowledge. So far I have only fragments, but I can see that the subject is infinitely rich and will permit developments which would not be unimportant. The work will be slow and require much reading, for I cannot publish it without re-reading Baco and Kant and without a thorough study of several classical physicists, e.g. Crawford. I have such comprehensive intentions for

this treatise that I will not permit it to see the light of day without the most rigorous criticism. I particularly hope to benefit from your criticism, which I am sure your friendship will not deny me.
With deep friendship and respect
Ørsted.

To Anders Sandøe Ørsted:

Hamburg, December 27th 1803

I am now at the Danish border and thus dare hope that I shall see you soon. Therefore I have little to write to you today. I intend to travel at leisure across Denmark, staying here and there for a few days in order to see the apothecaries' condition etc. On my journey I shall cross Funen, presumably quite close both to the place where my stepmother's parents live and to where Judge Jörgensen is staying. Whether I should visit them or not is a question that you may be able to answer better than I as our present relations with them may have changed since my departure or the like.

If you can answer me at once, send the letter to Hamburg, poste restante, if not, you can send it in the same way to Schleswig, where I shall arrive in 12 to 14 days.

Regards to your beloved wife and to you from your brother and friend
Christian.

2.

Journey to Germany and France (May 1812 – February 1813)

To Sophie Ørsted:

Altona, May 29th 1812

You may wonder that you have not seen a letter from me before, and even more that I have not yet got any farther. Regarding the former, the blame lies entirely on my procrastination as I dislike writing a letter except on a post day; and strangely enough the opportunity to write has not happened to coincide with the post days. The other cause for surprise will disappear when I tell you that in Kiel and here I have found several men and things of sufficient interest to detain me for some days. Now I must give you a short description of this already long journey. You know that I left Copenhagen in the company of Professor **Wedel Simonsen**. The weather was not favourable, but as long as the strong wind more or less allowed us to talk, we amused ourselves rather well. W. S., who is of the old **Anders Söfrensen Wedel's** family, is like him an ardent historian. He told me many of his historical ideas as well as anecdotes and conjectures. He told me that "der König in Tule" was **Waldemar Atterdag**, his beloved **Dove lille** (the little dove). For her he had built **Gurre Castle**, whose name W. S. would regard as a modified pronunciation of **kurre**[1]. The story says that she had given him a cup which after her death continually enchanted him to remember her and the place where he had lived with her, and that he could not rid himself of this enchantment until he had thrown it into the lake (Gurre Lake). On Funen, between Nyborg and Odense, he showed me a burial mound that, according to his claim, should be Palnatoke's,

1. *kurre* = to coo.

and near which lies a house that is still called the Palle house[2]. Near Odense he pointed out to me a mound that according to his claim should be Odin's burial mound.

Our crossing of the Belt was as beautiful as could be wished. The sharp wind that had prevailed the previous days had calmed, and we were transported by a gentle breeze, gliding lightly over the calm expanse of water. When we stepped on to Funen's soil, it was as if we had come to another climate. On Zeeland we had almost had winter; here we felt the heat of a warm summer's day. My travelling companion claimed that this was the difference between the climates on Zeeland and Funen; but everyone on Funen admitted that the day before had been extremely cold. However, he continued to defend his view with all kinds of philosophical arguments.

In Odense we did our accounts and found that we had spent 45 Rd each for our journey and provisions, which is much less than we had expected given the difficulties of the times.

In Odense I immediately visited the teacher at the grammar school, **Björn** and Apothecary **Krüger**, for whom Hermann is now actually working. He is very decent man, quite skilled in his profession, and apparently strict. He has promised me to make **Hermann** toe the line. I have asked him to keep a firm grip as there is plenty to hold on to. On my second day in Odense **Björn** took me to visit a **Kammerherre Hein**, who has some physical instruments. Der Mann hat mir nicht viele Freude gemacht[3]. A Captain **Friis** of the artillery took me from Odense to Bøigden, where I had a good crossing except for some rain. I left Odense at 4 o'clock in the morning, covered 6 miles on land, then 2 miles at sea, and finally another 2 miles on land all on the same day. The last 2 miles, from one side of Als to the other, were very pleasant. A good road, set in the most beautiful and varied scenery, makes the journey on this island the most interesting part of the route from Copenhagen to Hamburg. I spent the night at Sönderborg. I cannot get any farther today. You shall have the rest of my journey within a week, perhaps from Ber-

2. Palnatoke was a legendary hero from Funen and is mentioned both by Saxo Grammaticus and in the Icelandic saga, *Jomsvikingesaga*.

3. The man did not please me much.

lin. When you want to write to me, the letter should be addressed to Professor **Weiss in Berlin**.

Above the date on this letter you will see a N°1. In the future each half-sheet will bear its own number so that you can know for certain whether any letter has been lost.

Forgive the many deletions in this letter. When I have time and peace of mind, I shall write more neatly. Regards to all good friends.

I do not remember if I said that all good friends could see my letters. If that is the case, it must be understood with certain qualifications. In general, I wished only that the few who really wished to see them and ought to see them might read them on the spot, but that they should not circulate. I shall send personal letters with news of my existence etc. to those friends who do not come to you. I can see that the mail coach will soon depart; so I must close. – Be well.

Yours,
H. C. Ørsted

To Sophie Ørsted:

Berlin, July 7th 1812

Yesterday I received your most welcome letter, and I shall answer it already today in order to hold you to regularity in our correspondence. You may be surprised to see a letter from me still from Berlin. You may believe that I have been so taken with this city that I cannot leave it; and you may believe this even more when you hear that I shall stay here for 3 more weeks. I can, however, assure you that this is by no means due to any preference for the place; but some work detains me. I have taken on the task of translating and revising the long treatise on the new theory of chemistry that I read in the Royal Academy last year. This, a couple of previously published German treatises, and the part of my **First Introduction**[4] which deals with the spirit and division of the natural sciences, will constitute a small volume entitled *Versuche eines Physikers sich in seiner Wissenschaft zu orientiren*. However, it would be wiser not to talk about this in

4. *First Introduction to General Physics* (1811), KM III, pp. 151-90 and JJK, pp. 282-309.

Copenhagen until the book is published. The person who in particular has prompted me to undertake this task is Privy Councillor **Niebuhr**, to whom I gave what I have published in Danish. He will also find a publisher for me if the publisher of the chemical journal with which I am associated does not want to be involved in this deal. **Niebuhr** is an excellent man, warm and courteous in company and learned in the most beautiful sense of the word. In a strange manner he is at home in every science. He speaks about chemistry as a chemist. He knows not only the general theory, but he also has considerable knowledge of the details and speaks of them with better judgement than one will find in many chemists. But I must also tell you that he is the only person here whose company gives me any real pleasure. **Niebuhr** asks for a copy of the old song, in which **all the little pictures turned around**[5]. Weiss, who is otherwise my very good friend, and whom I see daily, has the best of intentions but is one-sided to the highest degree. He has almost crystallized in his investigations of the crystals of minerals. The other Berlin scholars do not satisfy me much. Hermbstädt is the one who in a way has shown himself to be the most obliging; but for all his courtesy he is a rude egotist and a weak naturalist. Klaproth has shown himself to be quite good and obliging and would be among the dearest to me here for his open nature and his integrity, were it not for the circumstance that he has devoted all his diligence to an area of science that I have pursued least so that we have few points of contact. The other Berliners are also quite courteous and promise everything that one asks of them but do not keep their promises. **Fischer, Ermann, Simon** have all promised to show me their collections of physical instruments, but as yet none has had the presence of mind to remember it; indeed, so far from it that **Fischer** was out the other day when I came by appointment to see his. **Schleiermacher** has not been of great use to me either. I visited him during the first days after my arrival but found him very busy. He answered little more than yes or no to what I asked him, scarcely invited me to come again, and has not come to visit me. Recently I met him in the Acad-

5. This sentence has been added in the margin. The quotation comes from an old ballad about Agnete and the Merman.

emy, where he did not make the slightest attempt to renew our acquaintance. I later heard from **Niebuhr** that **Schleiermacher** can hardly ever be moved to speak on scientific subjects; but otherwise he loves company and is so often at large parties that one must invite him 3 days before if one wants him to come. The Berliners are entirely too busy, or officious if you will. This spoils everything for a foreigner; because of the heavy pressure which the country has suffered due to the events of recent years, one can expect nothing more than what has happened, i.e. that everyone economizes and thus does not readily invite anyone. To arrange gatherings at tea-time instead is apparently not yet common although it would be very suitable. I have, however, been at a couple of such gatherings. **Niebuhr** has told me his tea-time, and I have also benefited from this with double pleasure because it was at his house. Let it be said parenthetically that one drinks tea there that is just as good as in Copenhagen, which for natural reasons is not otherwise the case here. You will naturally ask: But why do you not say a word about **Fichte**? I have visited him several times and have nothing to complain about. He has received me with as much friendship as I could demand; but I have not visited him very often because, due to the difference in our conceptions particularly of nature, no very comprehensive communication can occur between us. However, I am glad that he still remembers Denmark with such warmth. You can easily imagine that you are not forgotten, nor is Anders.

The university here is apparently among the best. Courses are generally if not always very well attended. The number of students is said to be 600 and would certainly be even greater in more quiet times. The university building is a former princely palace. It has a good location and a magnificent garden. It is a pity that the left wing is still occupied by a General v. **Hacke**, who has too much *Point d'Honneur* to allow himself to be driven out by the common good. – It is remarkable that what could appear to be the university's best feature, experimental natural science, is not. There are many teachers, but not one of them really fills his position. They have chosen the city's most famous men in the profession and persuaded each of them to lecture on his speciality for a small honorarium. Therefore they only half belong to the university. **Erman** lectures on physics,

without payment but also without experiments. **Fischer** lectures on mathematical physics, but in a part of town far from the university. **Klaproth** lectures on analytical chemistry, apparently extremely well, but he is hardly the right person for the rest of chemistry in view of the many advances in this science. **Hermbstädt** holds quite good lectures for the Philistines on applied chemistry and, incidentally, on his own merits.

So, here you now have an entire half-sheet about all sorts of learned and curious matters. This is somewhat poor in comparison with your beautiful, lively letter; but that was what I could do, so I must ask you to be content. Regards to all those dear friends who sent their regards to me in your letter. In agreement with the truth I testify that the good **Spies** is greater than our friend **Schumacher**.

Tell **Oehlenschläger** that he will not receive a letter from me before I have been in Weimar.
Be well and write soon again to your
H. C. Ørsted.

To Sophie Ørsted:

Berlin, August 18th 1812

If I should write a book of morality by example, which is very easy if only one is allowed to borrow these examples and is not obliged to provide them at one's own expense, if I should write such a book, I say, you shall be flaunted under the title of **Silence**. However, I shall know how to taint this honour for you with some remark about the unfairness with which you have caused me in particular pain with this virtue. You already have a bad reputation in Berlin for your far too exaggerated silence. Every post day I am asked if I have not had news from my country, and every post day I must answer no. Then I am asked, but who is your correspondent? To this I answer my sister-in-law, whom I have especially chosen because I was certain that she would answer me more diligently than anyone else. Then they attack my poor country, which is not greatly appreciated here, and regardless of what I say in its defence, I am constantly told: What good can one expect from a country where the best correspondent does not write? I always know how to find some answer

to anything else one may hold against Denmark, but I have nothing to answer to this. I know your perspicacity. If I could but extort one single letter from you, you would certainly help me out of this distress. Since I am used to hoping, I still hope for the best. I would also read my good Anders a lecture if I had hold of him; partly because he does not write himself, partly because he does not persuade you to do so with whatever good or evil might be required. Tell him that for once he ought to show that he is master in his own house. I can no longer receive any letters from you in Berlin because I shall leave on the 23rd and travel via Leipzig, Jena, Weimar, Gotha to Nürrenberg. If you do not want me to go without a letter from you for an entire quarter of a year, please write to me with the address **Nürrenberg**, to be delivered to Professor **Schweigger**. I shall have no other fixed station on my journey until I arrive in Paris. – I shall have splendid company on my coming journey, Professor **Erman**, who will accompany me to the Rhine. Together, we intend to make a little tour down this splendid river. – You may ask what I have been doing in Berlin for so long. However, I believe that I have written to you that I was writing a book. It is now finished and will be published by Reimer, the bookseller, under the title **Ansichten der chemischen Naturgesetze durch die neuere Entdeckungen gewonnen**. It will consist of approximately 16 sheets. So you see, or rather **Anders**, who writes books himself and knows my slowness, sees that I have not been lazy. If, in due course, anyone should mention that it was peculiar that I made use of my journey to write a book, it would not be amiss to point out that the most important part of the work was done at home, in Danish. The German is really just a rewriting of Danish manuscripts that I carried with me. The time that this work has taken from me will not burden the King's coffers as I can pay the associated expenses with my honorarium and still have something left. **Anders** should make note of all this especially if **Moldenhawer** or some other great gentleman should allude to this. I would prefer that nothing is said about this business in advance. As soon as the book is published, I shall send copies of it to Copenhagen. I have received from **Reimer** a draft for 100 Rdl Preuss. Cour. on **Brummer**, as partial payment for my work. From the remainder and from the money which I brought myself from

Copenhagen, I shall actually pay for my unnecessary stay here. I shall use my claim on **Brummer** to pay all that remains to be paid of my debt from the Danish edition of my physics book.

My long stay in Berlin has given me the opportunity to get to know it and many things in it better than would otherwise have been the case. I shall speak only of pleasant things here. You would hardly guess that the King's birthday was one of the events that I have enjoyed in Berlin. Even at the best of times, the Prussians have hardly loved their King so enthusiastically, and what is more, felt more intensely as a nation than now. Everything that took place was therefore heartfelt and well-meant. The University ceremony began at 11 o'clock in the morning. It is not the custom here to celebrate the King's birthday at the University. They only do this when they want to. The speaker, Professor Boeck, made a speech in good Latin, but in which modesty constituted such a long introduction that **Buttmann** later remarked that no introductions would be required for the next 7 years. In it he mentioned with regard to the freedom of the University, among other things, that it was delightful to live under a King whom one could praise without flattery and be silent about without resentment. The assembly was splendid and gave a visible demonstration of how many **high** scientific officials the kingdom has. In the afternoon the Academy of Science held a public meeting, where **Erman** made an excellent German speech, and where several quite interesting treatises were read. If this does not give much honour to the King, it does to the Academy, which does not exactly stand in high esteem here although it contains many competent men. In the evening I was in the opera and saw a piece which is called *die Vestalin*, translated from the French[6]. Another piece, *die Schlacht von Thermopyle*, could not be performed because of illness or something else. The most interesting for me in this piece was the music and the fine furnishings and decorations of the opera house. Performances are given there only on exceptional occasions. Last night I saw **Die Braut von Messina**[7], which was better than I

6. *La Vestale* (1807), an opera composed by Gaspare Spontini (1774-1851) to a French libretto by Etienne de Jouy (1764-1846).

7. A tragedy (1803) by Friedrich Schiller.

had expected; however, the chorus did not make a good impression. After the play a French dancer **Duport** performed to enormous applause. I wish that you could see him some time. The skill, the power, the grace, the perfect harmony with the music are things that are beyond description. One must acknowledge that his art is rewarded, for he is said to have brought 400,000 livres with him after a few years' stay in Petersborg. However, I can see that I have strayed quite far from the King's birthday. It is not finished yet. Late in the evening I attended a large party, to which **Weiss** had invited me, and which primarily consisted of naturalists and their families. The party was not over until 2 o'clock in the morning. The cheerfulness was extraordinary without the slightest discord.

I must also tell you about another smaller party that I attended by chance. One evening, when I wanted to visit **Niebuhr** but did not find him at home, it occurred to me to go to old Pastor **Hermes**, **Manthey's** uncle, whom I had almost totally neglected. As I came in the door, I was astonished to see the house so transformed that I asked the first person I saw whether I had made a mistake. But the person I asked was a daughter of the house, whom I failed to recognize because she had also been transformed. She ran to her father at once and returned with an invitation to hear him marry one of his daughters to a Herr von – I simply cannot remember the name at the moment. The wedding ceremony was extremely simple and brief but touching perhaps for that reason. Naturally, I stayed and took part in a very simple party in the spirit of the times.

You can easily imagine that I have otherwise not had many outings, I mean excursions[8], as a consequence of my work; however, the evenings have served for amusement, in particular I have visited, in addition to **Niebuhr** and **Hermes**, a Privy Councillor **Pistor** and a Councillor of State **Alberti**, with whom and their families I usually spend Sunday evenings in the local deer park, which is just outside Berlin. I have gone to the learned societies as often as I found it worth the effort. Weiss has occasionally taken me to the

8. The Danish word *udflugt* can mean either "excursion" or "evasion". The pun cannot be translated.

Lawless Society[9], as it is called, where one has dinner in good company on Saturdays.

Time does not permit me to describe my experiences to you in more detail. Regards to **Oehlenschläger**, old and young, **Spies, Colding, Miss Hjort** and, in short, to all good friends except **Anders**, who should regard this letter as also written to him.
Your devoted, letter-waiting brother-in-law
H. C. Ørsted.

To Anders Sandøe Ørsted:

Paris, December 11th 1812

I was just about to write another letter to you and Sophie filled with reproaches for your long silence when I received a letter from **Krum** which showed me that I was wrong. I do not know what it is that shakes me to the core when I hear that your are ill; it is as though someone was about to tear out a part of me. In the ordinary course of everyday life my love for my friends, even for you, often seems cold even to myself; with some event, happy or unhappy, which breaks this chain, I feel as if it were happening to me. **Krum** has consoled me that you are getting better, but this must go slowly after such an illness. Therefore, I hasten to write you a few words. I hope that you feel as I do; when I am not feeling well, news from an absent friend is a refreshment, and when I am recuperating, it works like a tonic. But I have another reason of greater importance for deciding not to delay this letter until I have written several others which I intend to write before the next post day. I know that such illnesses take away a significant part of your income. I know that you always make the greatest effort to recover what has been lost. Finally, I fear that, at such a difficult time as it is said to be in Copenhagen now, you will decide to make even greater efforts. Moreover, I know that you are not a man who can convince himself to use his well-earned credit. Therefore, let me make you an offer which ought to go without saying between us. Use my funds. Take from

9. *Die Gesetzlose Gesellschaft zu Berlin*, founded in 1809 to promote social and political reform in Prussia.

Abrahamson whatever he has not put in goods. Let him sell something if necessary. Take the income that there will be for me this winter, spend it as if it were your own, and do not wear yourself out. This money is so unnecessary for my happiness that I can do without it completely. I can never make a more beautiful use of it than to secure my brother's life and health, no use could be more to my advantage. I see a beautifully active life together unfold before us; it must not be disturbed at any price. I know your delicacy and fear that it will create concerns; but properly understood it should move you to accept my offer. If it shall not be just empty words that friends share all earthly possessions, then I think that you cannot refuse me; for I believe that if friendship and brotherly love can bind two people, then we are so bound. Therefore, make use of my little abundance as if it were yours, and let us not speak of this again in regard to what other loans we might make to one another, or whatever financial transactions that we might have. If some time you receive the abundance which your merits, indeed, even your efforts in your civic capacity, deserve, then I will not refuse to take from your abundance.

I must end; the mail is about to depart. Live well, my beloved **Anders**, let me see you healthy and well again. Many regards to Sophie from me.
Your
H. C. Ørsted.

In three days I shall send an entire package of letters to **Sophie**, my **Father, Oehl., Krumm**, etc.

To Anders Sandøe Ørsted:

Paris, February 25th 1813

Dear Brother,
Thank you for your dear letter. I am glad to hear that your health is steadily improving; I had imagined that you would not be back to normal until spring. I beg you not to overexert yourself. You write to me again about the money you have received from me. I beg you only to remember that I am not in need of it. I would not want you to work ¼ hour more each day in order to repay me.

I am pleased to see that you have been awarded the Silver Cross, which still seems to be viewed with considerable respect. Regarding myself, I admit that a Cross would have been useful to me on my journey; when I come home, I shall patiently await the day when that honour falls to me. If I should ever receive it, I shall not forget that I wear the same Cross as Becker. I hope that he owes his recommendation to the university administration.

It really pains me that Gruntvig is to escape unscathed. If I had been in Copenhagen, I would have assumed your role even if less forcefully than you could have done it. This man's enmity to reason has long inclined me to attack him some time; however, I prefer seeing him fall into your hands. Your letter already contains some strong epigrams about him even though you seem not to have thought about it. But who has said that he must be punished at once? If God gives you health in the spring, you might still think about him. He is a poisonous weed in our literature that should be pulled up by the roots. If he should ever obtain any power, he would be one of the most vile and evil tormentors. Enough about him.

I live quite well here and cannot deny that I profit considerably. They have come far experimentally. The manifold means that are spent on chemistry and the schools established for it mean that there are particularly many capable chemical workers. Such beautiful aids, united with some Scandinavian profundity, would accomplish great things. The attached representation to the King shows you that I wish to obtain similar advantages for my country. I would like this representation to be copied and delivered **as soon as possible**. If you do not want to do this yourself, ask **Krumm** to do it and give him my friendliest regards. I greatly wish to receive a prompt answer. Another letter to the administration is on the same sheet. It is a little wicked, but the unreasonable demand that I should have the responsibility for moving the instruments in my absence and, generally, the administration's greed to acquire for the University a collection that it should not have so long as this administration exists, deserve, indeed demand, such a response. However, read it through and see if anything there should perhaps be changed.

[Added in the margin:] If you think that I should remove the words "I have had the satisfaction …" until "… pay for it", do so for

me. I believe, or almost believe, that this bitterness is as wise as it is reasonable.

I have still received no answer to my application for 400 *species*[10], which I greatly need. Ask **Krumm** for me to press the case. If you see Collin, ask him about it for me.

Recently, I have spent much time with the chemist **Chevreuil**, a young man of considerable practical competence and much knowledge. His laboratory is only a few steps from my lodgings so that I can go there often and sometimes perform experiments myself. My theoretical ideas have won his approval. He frequently visits me in the evening in order to hear the French translation of my *Ansicht*[11]. I have also had the opportunity to explain my system orally to **Berthollet**, who received it quite well. A short excerpt from my book will appear in the next issue of *Journal de physique*. Have the copies come to Denmark? I must suppose that they have not since no-one has written a word to me about it. This is incomprehensible to me. I have recently sent a copy to **Berzelius** with **Rustad**, assuming that all my Copenhagen friends were already supplied; but if this is not the case, take this copy if not to read it (for I shall read it to you myself when I come, with explanatory comments, which I think almost indispensable for those who are not chemists by profession) then at least **to look at**.

I am making all possible efforts to finish here as soon as possible because I long to see my friends and to return to my old field of action. Otherwise, I have no regrets about the journey. In addition to the material benefits it provides, it also serves to expand one's field of vision, especially for people like me who tend to overlook things unless they are pressed upon them from many sides. Moreover I see, which one can also see without travelling, that there is no place where things go as they should; but one is reminded more forcefully of this by seeing both the good and the bad in so many forms.

Among other things that I have resolved is that, this summer, I shall give the lectures that I long ago thought to deliver on the spirit of science. I have the conviction that this will be able to contrib-

10. 1 *species* = 2 rix-dollars.

11. *Recherches sur l'identité des forces chimiques et électriques* (1813), KM II, pp. 171-77.

ute something to awakening the students from the lethargy into which a great many of them have sunk. I also hope to give my lectures in physics and chemistry a new glamour even though I am to give far fewer of them. Generally, I have worked out a very ambitious plan for the advancement of natural science at home, for which I have great expectations if I can find a willing ear, which I flatter myself I can. I shall not write to you about this in detail, but when we meet, I shall present it for your criticism before proceeding with it.

I hope that you can see at a glance that the factory which I propose will in no way collide with Father's, and that I could in no way imagine involving our Father in it. I greatly fear that when all is said and done, it will finally be necessary to take charge of his affairs.

Here ends my paper and hence my letter, which is of the nature that it can be ended equally well at any point. Be well, dearest Brother, and let me hear more from you soon.
Your sincerely devoted
H. C. Ø.

To Sophie Ørsted:

Paris, February 25th 1813

Dear Sophie,
You have given me great pleasure by writing to me even though you are not well. Besides having thereby had the pleasure that you have spoken with me, I also have the advantage that I have learned several things. Firstly, I now know that you are moving, so I can ask you: where? It is not enough to know that you are moving to Frederiksberg Street and to Hjarup, I need to know the number. Imagine my impatience if I should wander around in Frederiksberg Street asking for Hjarup (to whom this would be of no use) at the moment when I hastened to see Anders and you, and imagine if I had not known anything about the change, of which I now so accidentally learn, imagine that I had come to Copenhagen and had run up all Pohlman's stairs and met entirely new people there, what an inexpressible "See[?]!" people would have heard. If you have moved to Frederiksberg when I arrive, I must also know what the

address is, in short I must be prepared for everything if I am not to despair upon my arrival in Copenhagen.

Regarding lodgings for me, I shall be satisfied with temporary rooms for the summer if I cannot get anything else. However, I admit that I would rather have something permanent. From your letter I guess that the University administration has made arrangements for the instruments, which I did not know. I long for a letter from **Krumm**. It is about 7 weeks since I wrote to him.

You have read the second part of Goethe's *Life*[12]! I have not been able to see it yet. Here in Paris it is like being in Turkey as far as German books are concerned. On the other hand, I shall bring you a French almanac that will please you. It bears the title of the well-informed Caspar and actually has the portrait of the fortunate or unfortunate Caspar as the frontispiece. He is studying with much devotion – an ace of hearts. The book, full of songs for French Caspars, can be had for 2 *skilling* although the frontispiece is illuminated. But what else can I write to you from this great city, from which one should be able to write interminable letters without difficulty? I am quite embarrassed about this, for I have certainly seen many things, but the misfortune is that I cannot show them to you, and description is inadequate. What would interest you most is the art exhibition here. The number of paintings and sculptures exhibited here last year amounted to more than 1200. You can easily imagine that among them was much that was unworthy of such an exhibition. A large number were nothing but portraits. Other pieces were merely paintings of the most recent history of the country, in which contemporary men play the principal part. These pieces, along with many of the other French works, excel in splendid costumes and in brilliant colours that quite overshadow facial expressions. A magnificent large painting by **Tiers** in Rome, depicting Brutus condemning his sons to death, seems subdued because he did not want to give a tragic, majestic event the same bright colours that one admires in the works of the court painters. – The greatest sensation at the exhibition was made by two statues, one of them representing Terpsichore, the other a dancing girl. The latter is par-

12. *Aus meinem Leben. Dichtung und Wahrheit* (1811-13).

ticularly lovely, assuming that it portrays nothing more than a dancing girl and not, as many here will have it, Therpsichore dancing; for the position chosen seems to me not to be not that of a goddess at all. However, it is not of much help that I write to you about all this when you cannot see it, and I can hardly invite you to travel to Paris to do so. On the other hand, I do regret that I cannot invite you to the collection of antiquities here. You know that one finds here the very best of what the Ancients have left us of this kind, Apollo of Belvedere, Diana, Laokoon, the Medicean Venus. You have seen casts of three of them in Copenhagen and therefore have a clear conception of these works of art. I think we have no cast in Copenhagen of the Diana I mentioned, who is shown running and holding by the antlers a stag which she has beside her; but it is among the most excellent and is thought to be by the same artist as Apollo. We have copies of many other really excellent pieces; but marble, as you know, makes a very different impression on the eye than plaster, which moreover always has some inaccuracy; not to mention that the sight of these stone masses preserved for us through millennia always more forcefully and more touchingly evokes the memories which even the contemplation of mere copies awaken in us. The collection of antiquities is much better presented here than the paintings; for the antiquities are displayed in several beautiful and light rooms, the paintings are mainly gathered in one enormously long gallery, where the presence of such a multitude of works tends to overshadow the impression of the individual. This is even more the case as the pictures hang very close to one another so that the walls are covered with them, whereas the statues must always have some distance and in part stand so that one can walk around them. Therefore, when I walk among the antiquities, it seems to me as if I were in an old temple which had been unearthed from some Herculaneum; I feel as if surrounded by the "Vorwelt heil'gen Lüste"[13], while I must direct my attention to a single work and forget all the others if I am to enjoy the paintings. I hardly need to tell you that I otherwise like to tarry often and long among paintings. Recently I have also seen a very fine collection of paintings

13. Holy pleasures of antiquity.

which has belonged to the Italian princely house of the Giustiniani[14], where one finds excellent works by the greatest artists, far more successfully displayed than in the large gallery.

Before I close, I must ask you to send my love to my father, brother and sister-in-law, aunts, cousins, girls, etc. Tell Spies from me that if the thing happens which Anders teases him about, he really must forget **Berner**. I hope that you will soon regain your complete health. Live well, dearest sister-in-law.
H. C. Ø.

14. This collection from the seventeenth century was brought to Paris in 1807 and later purchased by the King of Prussia.

3.
Journey to Germany, France, and England (November 1822 – August 1823)

To Inger Birgitte Ørsted:[1]

Odense, November 1st 1822 in the evening

Here, dear Gitte, you receive the first letter from me on this journey. The crossing of the Belt was fine, but lasted until 3 o'clock as the current was much against us. We had passed Sprogøe after 1 ½ hours and would perhaps have been able to finish the entire crossing in 3 hours if entering Nyborg had not been so difficult. A long spit of land encloses Nyborg harbour on one side. We had to tack for two to 3 hours today to get around it. Cutting through the spit that bounds the harbour with a canal would annually save much time for many people. I was not sea-sick. We ate dinner in Nyborg. I visited Dr. Björn, the headmaster, while the food was being prepared. During the meal we were visited by Dr. Fryd, the surgeon, whom I think you have seen at Mrs. Möller's when you were young. He is now a fat doctor and has 6 children. Björn also visited me during the meal and really wanted to tempt me to spend the evening in Nyborg, but I would not give up any time; if I am to return home on time, I must not allow myself to be stopped at the first station. – After having obtained the proper information, I can see that I should cross neither at Boigden nor Faaborg nor Assens if I want to be certain of a safe crossing with the coach, but rather from Middelfart to Snoghöi. The crossing here is not even ¼ mile so that you can almost regard me as remaining on dry land. We depart for Middelfart early tomorrow morning and expect to be in **Hadersleben** tomorrow evening. So here you have the beginning of the account

1. All letters from this journey were sent to Ørsted's wife Inger Birgitte, called Gitte, unless otherwise indicated.

of my journey. You shall soon get more. Love to all the children, Karen, Christian, Marie and Sophie, not forgetting Søren. Let me know if they are diligent and good. Regards to Father and Mother and to all good friends.
Your
H. C. Ørsted.

[Added in the margin:] Do not forget the bills of exchange. Regards to Doctor Forchhammer. I will not frank this letter to you because it will be safer to send it unfranked under the circumstances.

Schleswig, November 7th 1822

Dear Gitte,
I have really only promised to write to you every second post day; but as long as I am so close to you that I can write to you more often without much expense, I want to do so. You know about my journey to Odense. The next day we travelled via Middelfart and came to Kolding in the evening. I cannot say that anything remarkable happened on this journey except that the ferryman at the Little Belt used a special trick to relieve us of 7 or 8 marks. When we came, he asked us if we wanted to order a coach on the other side in order to save time. He said this in a manner that led us to believe that a boat was going to cross, and we thanked him; but we later had to pay for this reservation as one trip. From Kolding, we came through Hadersleben and Appenrade to Flensburg in one day. Hadersleben is a beautiful town and has a beautiful park for walks outside it. Appenrade is also quite beautiful and has a very fine location. There I visited Doctor Neuber, who has established a spa-house. He has committed a blunder by publishing a description of his guests' illnesses. As hardly anyone except local people come there, and as he has stated the class of each patient, everyone recognizes them, and with great consternation the ladies see in print the confessions they have made to their doctor. Both Hadersleb and Apenrade seem to me to be of greater importance than most of our market towns.

As the road from Kolding to Flensburg is about 12 to 13 miles and not very good, we only arrived late at Flensburg, where we lodged with **Döll** at a good inn. The following day we paid an early

visit to Krauss, the High Constable, who would not let us leave until he had shown us the surrounding country, which is well worth seeing. The town lies at a harbour, well protected from the wind, in a valley surrounded by quite high hills. Art has contributed much to the embellishment of the region. Christiansen, a merchant who has a large sugar refinery and important oil mills, has built a road up the hills that has cost him about 8000 Rd in our currency. There are beautiful buildings around his newest oil mill. In the surroundings of the town a church is remarkable for its fine situation and a beautiful mortuary, in which there is a chamber where bodies can be placed until decay proves that they really are dead. If one of them should awake from a torpor, he will find a bell-rope with which he can immediately summon the people who live in the house there. Bindesböll made quick sketches of the things he liked best. – Flensburg is very extensive. One would find it particularly inconvenient because it has such a great length as it has been necessary to follow the narrow valley; but if one wants to go across the town, one does not have to wait for side streets: without ceremony one goes through anywhere, through houses, yards and gardens. After having walked ourselves to exhaustion, we had dinner with the hospitable and kind Krause, who had invited Doctor Forchhammer. His health is not of the strongest, and he is not as cheerful as our Forchhammer; but he is highly respected and much liked in the town. Mrs. Krause is a comely little woman. They have a daughter of 9, a son of 4, pretty children, and a little one of 6 months, whom I did not see. In the evening we drove to Schleswig, where we arrived at 10 o'clock and found very beautiful lodgings with Seest, an innkeeper. Yesterday morning I went to the Landgrave, who received me most favourably and asked me to dine every day for the duration of my stay, which did not please our Chancellor. Both in the morning and in the afternoon, I had to spend time with the Landgrave, who asked me about many chemical and physical subjects and told me his ideas about many things. He is undeniably a very brilliant man with much knowledge and a very lively imagination. I shall visit him again today after he has dealt with his correspondence. Last night I went to a very jolly party at Spies' house. Svadecani was among the guests. I had already made his acquaintance in the morn-

ing. When I went up to the castle yesterday, I could not see where one should enter; the castle is an unusual building because it has been somewhat rebuilt in a modern style but not yet finished. Just then I saw a carriage roll into a shed that abutted on the building, and a white-haired man got out, waved to me, and came to meet me. He immediately asked me if I was not Prof. Ørsted, upon which I asked in return if he was not Councillor of State Svadecani. In this way we became acquainted, and, dispensing with all formality, he led me directly to the Landgrave's library, entered and announced me, and thus made me feel at home there at once. Returning to Spies' evening party, I want to tell you that I met the excellent teacher of the deaf-and-dumb, Professor Hensen, and the similarly excellent doctor of the hospital for the insane, Dr. Jessen. I heard from him that he has Carl Brandis in his care and hopes to see him completely recovered, which he also hopes will be accompanied by a serious change in his way of life and study habits, so that he entertains the best hopes for him. The party also included a Councillor of State Krichou, who intends to make apple wine according to my method. Fortunately, I still had a copy of the description with me. Also at the party was my old acquaintance High Constable Jessen, who took me and my travelling companion to Spies. We were thus taken by the police and brought before the Chancellor, which sounds quite dangerous. – However, I must think about ending my long letter, which I suppose you might find too long-winded; for what is amusing for us to see and experience is of little amusement in a dry description. Although I have to say that I enjoy the pleasures of the journey, I still long for you and our children. Love to them all from Father. Is **Karen** diligent? Is **Christian** docile? Is **Marie** learning more letters? Has **Sophie** cut more teeth? Is Søren avoiding reprimands? Regards to Father and Mother, Anders and Mathilde, Forchhammer, and all good friends. If you see Thune, tell him that I shall send the bulk of the remaining manuscript for the physics book in a week. The same message can be given to Zeise. – Both paper and time are running out. I embrace you in my thoughts.

Your

H. C. Ø.

Schleswig, November 10th 1822, Sunday

Dearest Gitte!

I have been detained here much longer than I wanted as the Landgrave could not finish all he wanted to tell me in less time. I shall leave early tomorrow and hope to be in Hamburg tomorrow evening. If I did not constantly think that the journey must have an end, I would like to stay here even longer because I am so satisfied with my reception. I come to the Landgrave every day at 1 o'clock and afterwards dine at Court; however, I dined once with Svadecani, who requested this of the Landgrave. One evening I was with *Landrat*[2] Ahlefeldt, who is married to a Miss Klöker, a very witty and interesting woman. Another evening I was with High Constable Jessen, one of my old table companions. I have spent two evenings with Spies. Yesterday evening I held an experimental tea. At tea-time and with the appropriate tea, I showed the galvano-magnetic experiments that some people still wanted to see. I think I told you in my last letter that I have seen the deaf-and-dumb institute here. Among other things, I saw there a well-equipped printing works, where they print the Bible in stereotype, or standard letters that are cast into plates, so that they can be produced at a very low price. You will soon receive a copy which I bought there. I have also seen the hospital for the insane. The greatest order and calm reign there so that the visitor, for the benefit of the patients, loses the interest he would otherwise have in the unfettered manifestations of the deranged. I do not claim such interest for my part, for seeing the place as it was made a deep impression on me. On the other hand, I saw the cathedral here with true pleasure. It is a quite beautiful old Gothic building, but the finest thing there is the altarpiece, carved in wood by Hans Brügmann. It depicts the complete Passion and some other biblical events. It is 25 *alen*[3] high and 12 *alen* wide. The wood has a thickness of 2 *alen*. Its 22 panels contain 398 principal figures, admirably well crafted with excellently conceived facial expressions and postures. Thorvaldsen gave this work his highest

2. Chief administrative officer of a district.

3. The *alen* is a Danish unit of length, traditionally defined as the distance from the elbow to the tip of the little finger. One *alen* is approximately 63 centimetres.

praise. The work took 7 years and was completed in 1521. It is told that people from Lübeck commissioned a similar work from him, but that Schleswigers blinded him out of jealousy.

The 11th. I have brought the letter with me from Schleswig and now write a little continuation in the evening at Itzehoe. Yesterday I took leave of the Landgrave, who gave me letters of introduction for Paris. I took proper leave everywhere and spent the evening in the company of Svadecani. I stayed there until 12 ½ and yet was ready at 5 in the morning so that we were able to depart at 6 o'clock. In Rensborg I met Lehmann, whom I asked to tell you that I shall behave better in the future than in Schleswig, where I stayed 6 days instead of 2. I now write the same to you in the hope that my letter will come before him so that you can give him my regards instead of him giving you mine. It is 9 ½ miles from Schleswig to Itzehoe along very mediocre roads, so we did not arrive here until almost 8 o'clock. I hasten to write these words, sipping my tea now and then while writing. The letter must be taken to the post office immediately. I shall leave here early tomorrow and hope to be in Hamburg in the afternoon. Please send your next letter to Berlin and mark it "abzugeben bey der Königlichen Dänischen Legation".

Enough for tonight. Love to the children from their tired father. – Tell Father that he shall receive a letter from me from Hamburg. Regards to Anders and Mathilde and all our other friends. My most heartfelt love to you.

Your

H. C. Ørsted.

Hamburg, November 18th 1822 in the morning

Dearest Gitte,

You will only get a very short letter from me today, as I am just about to get on the coach to travel to Berlin. Your two letters have arrived safely, and I shall answer you from Berlin. You will also receive my journal from Hamburg. We have lived very well here and received all the gestures of friendship that one could wish. Schumacher and his wife send their regards. I did not stay with them as they recently had the misfortune that his mother died, but I had to listen to many friendly reproaches on that account. Father and An-

ders will receive letters in a week. – Along with this short letter I enclose a very long one to Thune, which contains my manuscript for the physics book. The little that remains will come from Berlin. I have to send this unfranked as I cannot deliver it to the post myself.

I embrace you in my thoughts, sweetest **Gitte**. Regards to all the children, Anders and Mathilde, Father and Mother, Forchhammer and all our other friends.

Your

H. C. Ørsted

Berlin, Novemb. 21st 1822

Saturday morning.

Dearest Gitte.

I have now finally arrived in Berlin. The journey from Hamburg to Berlin is always among the most boring. Part of the trip is as if through a desert, with the exception that one comes to some populated place once every two or three hours. The deep sand, in which the carriage swings back and forth, could easily make the unaccustomed sea-sick. The slowness, the desolation, the lack of all signs of humanity other than the deep wheel tracks make the day-long journey through Mechlenborg in particular quite dismal. Things soon become better in Brandenburg; plantations, mile- and signposts displayed at every necessary place, and finally more houses make the journey less unpleasant. The signposts that I mentioned are poles with arms of narrow boards. These arms point to the towns where the road goes, and on them are written the places to which it leads. We left Hamburg Monday morning and stayed the first night at Böitzenburg, a small town with a good inn. We spent the second night at Lenzen, the first Prussian or Brandenburg town on this route. From Lenzen we travelled all day and the following night and arrived at midday around 2 o'clock in Berlin, where we took rooms at the King of Portugal Inn. I visited Prof. Weiss already that afternoon. He was not there at that moment; but as soon as his wife heard who I was, she welcomed me as a friend of the house and immediately invited me to stay with them. This was done in such a nice way that I could not refuse although I would thereby be separated

for a week or so from Bindesböll, with whom I have a complete understanding in such cases, and to whom I shall not cease to be helpful here as well. I have not been here an entire day, besides the day of my arrival, and yet I have already seen many friends. I have visited **Erman** and **Karsten**. Yesterday afternoon I had so many visitors that I quite feared that it might be too much for my friend **Weiss**. The two Roses, Karsten, Muhr, Bruun visited me. I also visited Seebeck yesterday evening. Tomorrow he will show me his optical experiments, on Monday Erman will show me his magnetic. Karsten, who is Chief Mining Councillor, will show me the iron foundries. I hasten to make use of everything as well as I can and think constantly about my homecoming. – I have not yet told you about my stay in Hamburg. Schumacher wanted me to stay with him, but as his mother had just died, I took lodgings in Hamburg and immediately visited his wife in Altona. The following day I saw the botanical gardens with Lehmann and also a lithographic printing works, where, however, there was no opportunity to buy anything. The most beautiful works were portraits of Hamburg, drawn by **Grözer** and **Aldenrath**. On the same morning I also saw Repsold's workshop, which is characterized by the most ingenious and accurate tools. This was very instructive for me. The next day we [added in the margin: Repsold, Bindesböll and I] visited Schumacher at Ahrensburg and went with him to the church tower at Sick, from where he made some observations so that we could see some of his beautiful instruments in use. We returned the next day in the company of Schumacher and, on the way, saw one terminal point of the line of position that is being measured. That day and the next we had dinner with Schumacher, on Sunday with Repsold. I was obliged to visit Schmeisser in Altona and helped him to set up a galvanic device. I also visited Zeise, who used to be my amanuensis and is now an apothecary in Altona. He has made many beautiful arrangements in his pharmacy. Among other things, he has established a public bath and uses the steam from it for his distillers, which he has arranged very well. He is married and has a son. He begged to be remembered to you and made many inquiries about our children. I had almost forgotten to send you many regards from Mrs. Schumacher. Since her mother-in-law's death she is more so-

ciable, and this suits her. I have visited Rist and Sieweking in Hamburg. The good doctor, who is now also a syndic, has become so fat that all the similarity you once found between us has now disappeared. In order to become even fatter, he is about to get married. He will have a Mademoiselle Chapanromp, who will bring him considerable wealth. Now you must be content with this dry description of my travels. I must talk a little about home. It pains me that Søren has behaved so badly. He must abandon his untruthfulness or leave the house, and I will not spend one *skilling* on his studies. Those who lie must have nothing to do with the sciences. I hope that you have taken from him the silver coin you gave him for his fabricated diligence; if not, do it now and give it instead to a good and diligent poor child. You have forgotten to tell me if he has received a well-deserved licking for his untruthfulness. In a case like this, he should have a double portion, one for his laziness and a second bigger one for his lie. Do let me know if he shows any sign of improvement. Does he go regularly to Hald and Hunderup to be examined? Tell Karen and Christian that it pleases their father when they behave well, and ask them to be diligent so that their father can have the pleasure of bringing them something very good and beautiful from Paris. Ask **Marie** for me if she will read to Father when he comes home. Kiss little **Sophie** for me. I long with all my heart for a letter from you. Presumably I shall get one with the next post. I must ask you to address your next letters to **München** *abzugeben bey dem HIrn Mechanicus Frauenhofer.*

I write so little to you about how often I think of you, and how often I wish to be with you although my journey otherwise offers me every comfort I could wish for. But I know that you understand my heart and do not require proof of how dear you and the children are to me. Without you, a part of myself is missing. My greatest pleasure is to hear from you often.

Love to Anders and Mathilde. I shall write to him from Berlin but will wait until I have spoken with some of the men who are of particular interest to him. I enclose a letter to Father.

Your

H. C. Ørsted

Berlin, Decemb. 2nd 1822

Dearest Gitte,

Once again today I must write to you with some haste. The eagerness with which I try to make use of time here leaves me very few moments. I have been received here in the friendliest manner. You know that I am staying with Weiss; he and his wife make every effort to make my stay comfortable. The first couple of days, until I had paid my visits, I was with them very quietly at dinner and in the evening; but in the last week I have been invited out every evening, not to mention a few dinners. I have been invited to Privy Mining Councillor Karsten, my good old friend from 1801, Privy Councillor Pistor, more engineer than privy councillor, Professor Horckel, the chemist Hermbstädt, Erman, Lichtenstein, Dr. Kohlrausch etc. Everything that I want to see is shown to me with the greatest willingness. Seebeck has spent two mornings and one afternoon showing me his new experiments, of which many of the most important are continuations of mine. I have made some observations of the strength of the magnetic force in Berlin with Erman, I have performed many experiments with Mitscherlich and Rose, but only to exchange information and not to discover something new. In a manner of speaking, I see Berzelius's laboratory in Mitscherlich's. Weiss tells me what he can about his theory of the nature of crystallization. I have seen the famous iron foundry here; and today an artist by the name of Posch has been with me in order to pose me for a portrait which the Mining Authority has decided to have cast in iron so that one will henceforth be able to purchase me for 1 Rd. Tomorrow, I shall visit a remarkable sulphuric acid factory 4 miles from here in the company of Weiss, Seebeck and Rose. After that I shall remain a few days in Berlin but then travel to Halle, where I shall stay only 1 day, and then on to München. By the time you receive this letter, you will probably have sent one to me in München. According to my calculations, you can send one more there. If it should arrive a little late, it can easily be forwarded to me.

But now I must tell you one or two things about Berlin. This city has long been known for its beautiful buildings, of which many are decorated with statues and other sculptural work; but it has been beautified even more in recent times. This is particularly true of the

area where I live, in the vicinity of the University building. This area has always been among the most beautiful in the city. From my windows I can look down on the great lime avenue, which is the city's most elegant promenade. At the end one can see the Brandenburg Gate, on the top of which is a triumphal chariot, which the French had taken from Berlin to Paris in their days of victory, but which the Prussians later brought back. It is well-known that General Blücher, at the engagement in the vicinity of Paris shouted to his soldiers, "Get me the chariot again, boys," and thereby inflamed them so that one here sees another example of how unwisely a conqueror acts when he takes pride in humiliating his enemy. However, I see that I have wandered too far from the place where I am. This area is bounded by the opera house and the armoury, two excellent buildings, the royal residence, the drill grounds, *Gendarmenplatz*, where two magnificent spires attached to indifferent churches and the splendid though not large playhouse are to be found. I visited it today with Bindesböll. In addition to the stage and its fittings, it contains an excellent concert hall with adjacent rooms and galleries. Large balls are also held here. Although the playhouse seems small even from the inside, it has room for 1500 people, the majority of which must sit in deep loges so that they do not have the pleasure of being seen. One play I have seen there is **der Freischütz**, which we know as *The Marksman*[4]. The enormous theatre machinery to be found there worked excellently. I do not want to judge the most important, the singing and the playing, but I was well pleased. Tomorrow evening I shall attend a concert, to which I have invited Weiss and Mrs. Weiss; a wonderful concert is expected. – The Crown Prince of Sweden[5] has been passing through here. On this occasion I saw a big parade of about 10,000 men disposed practically under my windows. It is a beautiful spectacle when one has the opportunity to see such a large concentration of well-dressed and well-disciplined soldiers.

I have had frequent visits from countrymen. Muur, who spent a couple of years with me, comes frequently. He is now a doctor, although not an examined practician. He has lost all his grand pros-

4. Opera (1821) by Carl Maria von Weber (1786-1826).

5. Josef Frans Oskar, later Oscar I of Sverige (1799-1859).

pects because Dr. Coreff, who had great power with the state chancellor, has lost his influence. I must therefore regret that he is engaged to be married. He is very helpful to me. – Bruun, who was to have travelled with me, comes frequently. He is very pleased with his stay here, which he owes to me. You can see that I write to you as things occur to me without any particular order; be content with this, my dearest Gitte. Love to all the children. Love to Father and Mother, Anders and Mathilde. Do not forget your sister Marie, whom I so often forget to mention. Regards to Forchhammer and Zeise, in short, regards to all those whom you know that I usually send regards to.
Your
H. C. Ørsted

[Added below:] The necessary papers concerning Suell's auction, cheques to you for the coming quarter, letters to Anders and to Forchhammer with the next post.

Berlin, Decemb. 2nd 1822

Sweetest Gitte,
In addition to my longer letter I must write a shorter and more confidential letter to tell you how much I think about you. I have received your dear letters. They are truly refreshing every time. The only thing that could add to the pleasure I enjoy on my journey and all the honours which I receive would be to be able to talk directly with you about it and to rest in my Gitte's arms after the many events of the day; then I would feel a happiness which only few could match. Everything that you tell me about Karen pleases me greatly. I include here an answer to her letter. Weiss and Mrs. Weiss have read it and could understand most of it merely with the aid of German. I do not show your letters even though they could certainly stand it. You will soon see that I have thought about the other children, too. Almost simultaneously with this letter, Firmenich the confectionerwill deliver some things to you from Berlin. There you will find: 1) A copperplate depicting the Holy Margrethe[6] step-

6. The Holy Margrethe of Højelse, Denmark's only female saint though not officially canonized. She was killed by her husband, Herlog, on October 25, 1176.

ping on a dragon. This is for Anders on his birthday. 2. Iron candlesticks and some very fine iron medallions. You could give either the candlesticks or the medallions to Winkler as you please. If you would like more candlesticks, you can have them. They will cost about 1 *species* each. 3. An iron device for knitting for Karen. 4. A picture book for Christian. But you should read some of it yourself to give the children the amusement that it can offer. 5. A pair of candlesticks for little Marie. I ask you to buy some little thing for Sophie in Copenhagen and give it to her from Father. Søren can also expect gifts when he mends his ways, but not before. In the box you will also find a little silver-plated base for a salt-cellar, which is noteworthy just because I saw it made in less than 5 minutes by a local silver plater, Hosaner. As you see, you do not get more on this occasion than the candlesticks or the medallions and this base. I hope to find something better in Paris. – One of the medallions is hideous. It is Klaproth's portrait, which I will keep for myself. – Be well, my dearest Gitte. I embrace you in my thoughts.
Your
H. C. Ø.

Berlin, December 10th 1822

Dearest Gitte!
Today, just as on the day I left Hamburg, you get a very short letter. From the two letters you have got from here, you will have seen how well I have been received here, and how eagerly I have tried to make use of the time. Here, I only want to tell you briefly that I shall leave Berlin in a few hours and go to Halle, where I shall stay only one day, and from there go on to München. For safety's sake, I ask you to address the next letter after the receipt of this one to München, from where I can easily have it forwarded if it arrives too late. I have stayed in Berlin for 2 weeks instead of 1; but I have seen and enjoyed the scientific advantages which the city has to offer as though I had been here for 4 weeks. I have spent 4 mornings with Seebeck. I have spent one at the Berlin Polytechnic School, which is called *die Erwerbsschule* and is run by a Privy Councillor Beut. Mint-master Gödeking has shown me the most interesting things at the mint and a remarkable paper mill. Mitscherlich and Rose have shown me all

Berzelius' techniques and instruments, which has taken two or three days. I have investigated the strength of the magnetic force in Berlin with Ermann. I have visited the playhouse, which is quite a new building full of interesting devices; but I have also once attended a play as a spectator, as I have already told you, and once a concert. I have tried to avoid parties these last days in order to be finished, and during this time I have spent only one evening with Seebeck, where the party was very interesting and scientific, and another in **die gesetzlose Geselschaft**, where Buttmann's birthday was celebrated, although with more noise than true cheerfulness. On that occasion someone read a witty poem by Professor Rühs, who died two or 3 years ago. They seem to repeat this reading every year.

Today I shall send you by slow post my posed portrait in wax, which the Mining Authority has commissioned as a model for casting in iron and then given to me. – You will soon get plaster casts of it, iron casts some weeks later. You will get a small bill for these which should, as far as I know, be paid to Prætorius. I must hasten to finish my letter. Love to Father and Mother, Anders and Mathilde, Karen, Christian, Marie, Sophie and, if he is diligent and well-behaved, also Søren. Be embraced in my thoughts.
from Your
H. C. Ørsted

Herewith I send my authorisation for you to draw my salary for me. You know that Hornemann gets it from the Royal Academy.

Jena, December 15th 1822

Dearest Gitte,
I had to send you a very short and hurried letter at the end of my stay in Berlin. Everything colluded in hindering me from writing; I was always invited out or had appointments about things I ought to see or received visits. I spent the hours that remained with Weiss, who often said that he would not have had the chance to speak properly with me if I had not come to stay with him. Our time together has been very useful for strengthening and securing our old friendship. In his scientific opinions, Weiss is, on the one hand, undeniably very thorough and both honourable and serious in his in-

vestigations, but on the other, he is also one-sided and very intolerant. Therefore we had several rather heated conversations about fundamental ideas in science. Weiss cannot express himself easily and has opinions on the issues discussed that differ from those of all others, and which he himself has not yet really clarified; my opinions on the same subjects (namely, on the way in which one should regard the fundamental forces of bodies being distributed in space) are more fluent. This initially resulted in his being annoyed and declaring that he did not like trying to convince anyone of his opinions. I dare say that I kept my head. The next day he brought the subject up again and accepted contradiction more easily. Many misunderstandings were simply due to the manner of expression; regarding other matters, we realised that the disagreement was primarily about matters that may be too deep for either of us. All Weiss' fundamental opinions are connected to his theory of crystallization, or are placed by him in this connection. Therefore, I attempted to be enlightened by him in the basic elements of this theory and now believe that I have a clear idea about it. I have thus left the strife with the prize of having learned something new; and Weiss may have become somewhat more careful in his judgement of the opinions of others. In any event, our intimacy grew after these discussions. Weiss and his wife treated me as true friends in every sense.

Already on the day of our departure, I wrote to you that we were to leave Berlin on December 10th. We left in the evening and made use of the night as the road was very good. In the morning at dawn we came to Wittenberg, as we had expected, and there saw **Luther's** monument. A kind of Gothic cast-iron portal stands on a granite base, and under the portal stands **Luther** with the Bible in his hand. There are appropriate inscriptions on the base, including "Eine veste Burg ist unser Herr." We also visited the cell in which Luther lived during the final days of his monastic life and taught, already a doctor of theology. Everything is still as it was in his time, and no one has lived there since. It is quite remarkable to see how simple and clumsy the tables and chairs were in those days. The most remarkable feature of the cell was otherwise undeniably Luther's portrait by **Lucas Cranach**. This famous artist was mayor of Wittenberg; his house with his coat of arms can still be seen. **Luther's**

house is also still maintained. Our guide also took us to the church in which Luther lies buried. One finds some excellent **bas-reliefs** there, cast in bronze; among them, the heavenly coronation of the Holy Virgin, which seems to me one of the most beautiful works I have seen. Otherwise, Wittenberg is quite deserted now since the abolition of the University[7]. As soon as we had seen these wonderful remains from the time of the great church reformer, we travelled on but spent 10 hours on the 8-mile-long road to Halle. We arrived there a little after 8 o'clock in the evening. I had myself taken immediately to Schweigger, who was very happy to see me. He was not well but immediately made arrangements for a little afternoon party on the following day. Immediately the next morning we visited Meinecke, the other editor of the chemical journal. He took us to Steinheuser, who has written a great deal on magnetism. Among other things, he has described a new method to make far stronger magnets than usual, but here I learned and saw with my own eyes that his new method does not accomplish more than the old one. I had expected to see magnets that could bear more than 100 pounds, but his biggest magnetic magazine[8], as he calls it, could not bear 30 pounds. However, people in Berlin and other places near him still believe that he has excellent magnets. The same morning I also visited Doctor Winckler, astronomical observer and noted for his barometric measurements. The observatory lacks good astronomical instruments; on the other hand, Winckler has procured and constructed some good barometers and other meteorological tools. His enthusiasm deserves praise for its altruism; for he only has 100 Rd in annual salary as an observer; besides that, he is a tax collector and works for the Weights and Measures Office. I pleased him greatly by telling him that the Elder Horrebow had been a customs officer before he became a professor. In the afternoon I was with Schweigger. He showed us some of his equipment, and I showed him my experiments on the compression of water. Meinecke, the

7. The University of Wittenberg was closed in 1815 and merged with the University of Halle as Martin-Luther-Universität Halle-Wittenberg (opened 1817).

8. The device in question was composed of a number of flat magnetised steel rods arranged in parallel and bound together by an armature.

mathematician Professor Pfaff, the anatomist Prof. Meckel, Steinhäuser, the mineralogist Käferstein, and others were present. Meinecke and Käferstein took us to a big gathering of ladies and gentlemen, who assembled for the first time in a large new building which has been built for the freemasons. There I made the acquaintance of Dr. Meiners, who is an apothecary in Halle and not unknown in chemistry, and of a Dr. Werber from Freiburg, who applies himself to comparative anatomy. A good deal of our conversation, especially after dinner, was scientific and brought us closer together; Werber, in particular, seemed to have acquired so much interest in a closer acquaintance that he visited us at the inn the next morning and remained with us as long as he could. I spent a few more hours with Meckel, Schweigger and Meinecke in the morning, after which we travelled to Nauemburg in the afternoon. We arrived in Jena the following day at noon and visited Ocken and Döbereiner on the same day. The former invited us for punch in the evening. Döbereiner, Kieser and a Professor Andreæ were there. We were treated to a thin punch but got nothing at all to eat with it. The following day I had a visit from the mathematician **Posselt**, who is now a professor here, is married and has a son. I went with him to the old physicist Professor Voigt, who received me very kindly 20 years ago, and who still looks as he did then. I also visited Professor Lenz. Through his enterprise, he has established a large mineralogical museum by founding a mineralogical society[9], where he has done everyone who gave minerals to the collection the honour of making him a member. Since then, many who have not had this goal have also given substantial gifts. Our Prince Christian has also given a great deal. Recently, Lenz held his jubilee, which was accompanied by many celebrations. Among other things, he was surprised by an amusing invention, perhaps following an idea of Göthe. Lenz belongs to those who believe that the earth originates from water. Another faction, which is again becoming dominant, assumes that it originates in fire. So a silver epergne depicting burning volcanoes was brought in and placed before him on the table, and a poem by Göthe accompanied it, in which Vulcan invited him to abandon the service of

9. *Societät für die gesammte Mineralogie zu Jena* was founded in 1797.

Neptune. Then the volcanoes began to erupt, and one of them emitted a medal, another an order of merit, and yet another ducats. I met Lenz at the collection of minerals, where he lives. The day after the jubilee, which had lasted well into the night, he was again at work in the collection at the usual time. He is now 78 years old. While in the collection I made the acquaintance of a Dr. Göpel, who is beginning to be known as a chemist, and who is an apothecary here. In the afternoon, **Posselt** took me to a gathering of distinguished citizens. This society is called **The Rose**. I saw his wife there and had tea. At this gathering I met the botanist Voigt, a son of the physicist. I became acquainted with him as a very young man the first time I was in Jena. I also saw the bookseller Frommann, whom I know quite well from my time with Ritter, and Madame Frommann. She asked me about Oehlenschläger, and I had plenty to tell her. I was pulled here and there in order to make new acquaintances. A Privy Legal Councillor Martin sought me out to ask about my brother. He wanted to get to know him better and will send him a book which he is currently publishing. I was going to write to my brother about this and other events from my journey; but everything imperceptibly ends up in your letter; he will have to read it there. Ask the good Anders to be content with that for now. The journal which I send here will show both him and you that I scarcely have time to be alone on this journey, except for the moments when I have to get ready to go out or to depart. I started this letter in Jena but complete it in Erfurt on December 17th. However, I must return to the chronology of my journal. In the evening we gathered at Döebereiner's, where Ocken and Andreæ, Posselt and a professor of philosophy Bachmann also were. The party was very jolly. The next morning, that is, December 16th, we travelled with Doebereiner to Weimar. He took us immediately to Göthe, who received me most warmly and spoke a great deal about my electromagnetic discovery. A letter was produced in which a Dr. Neef of Franckfurt advanced a suggestion for an electromagnetic investigation. I pointed out the problems with it and described how the experiment must be performed. Goethe understood it perfectly, and it was decided that Doebereiner would perform it with Goethe at Christmas. When I said to Goethe that it pleased me as a naturalist

to come into closer contact with a man I had so long admired as poet, he said, "Indeed, what can one do better in old age than to throw oneself into the arms of Nature." He showed us several things related to optical experiments, without our coming to a deeper explanation of our different views on the subject. He invited us to come in the evening after the theatre; however, Doebereiner could not accept as he had to return to Jena. Bindesböll and I accepted the offer gladly. At the table d'hote at the inn, we met a Dr. Thon, who immediately showed himself to be very obliging. He is working on a large lexicon of natural history which will be published by the *Industrie-Comptoir*[10], which now belongs to Medical Councillor Froriep. He was away travelling, but Thon showed me this great establishment, wherein are gathered not only very large letter printing presses but also copperplate printing presses, lithographic presses, etc., all that pertains to the publication of great works. Thon can be regarded as a kind of official at this establishment. From Thon we went to the playhouse, where we saw a completely new play, **Staberles Hochzeit**[11], really a catchpenny play but, as we heard, performed because they had a very competent actor from Bremen who excels in such plays. From the play we went to Goethe, where we found his son Counsellor Goethe, his wife and sister-in-law, and a Chief Architect, who as far as I remember, was called Condrecy. Thus Bindesböll had been considered. Immediately after we had arrived, Goethe took out a magnificent work on the cathedral in Coelln, which is one of the greatest masterpieces of Gothic architecture. The copperplates are also masterpieces of their kind. Here we have the curiosity that one of the copperplates depicts this old church as finished although it has never been; but they were so fortunate as to find the original drawings according to which the church was to have been built. Goethe made many instructive comments about this. I told Goethe that he must have greater enjoyment of such a work than others as he was really the first to draw attention to the greatness and depth of Gothic architecture. There was much talk about natural science at table. Among other things I explained my

10. *Landes-Industrie-Comptoir*, a publishing firm in Weimar.

11. *Staberle's Wedding* (1822), a farce by Adolf Bäuerle (1786-1859).

theory of heat to him and received his approval. We spoke of the confusion which rules in chemistry as a consequence of the rapid succession of discoveries. It is not impossible that a chemical conference could be arranged in Weimar at the time of my return journey. It is impossible for me to describe in a letter the rich contents of the entire conversation, in which a man as brilliant as Goethe continuously expressed beautiful, clear ideas or had such an inspiring effect on the company. After supper we discussed his theory of light. In a way, he urged me to do this himself. I stated some reservations which he received with great kindness, expressing the opinion that we would come closer to agreement on this subject if only we had more time together. I really doubt that; but I was pleased that he explicitly declared that he had not intended to attack the part of the theory of light which concerns the refraction and reflection of light, but that he only wanted to deal with colours. I told him that I did not regard our present knowledge of this as complete, and that I had made it one of the primary goals of my journey to learn everything related to this matter. We did not part until 12 o'clock, well pleased, without agreeing about everything. He expressed his wish to see me on my return journey; and if that is possible, I shall grasp the opportunity with pleasure.

But now I shall end my long letter without relating anything about **Erfurt**; I do this partly because it is late, and we shall travel on at 6 o'clock in the morning, and partly because I do not want to serve beer after wine by telling you about any of the good people here.

Now accept my most loving and heartfelt greetings. Love to Karen and Christian, Marie and Sophie. If Søren is diligent and well-behaved, then give him my love, too. I wish that I would soon hear that he has made up for everything that was neglected. Love to Father and Mother and Bodil, Anders and Mathilde. Tell Forchhammer that I shall not have time to write to him today either, but that Weiss has read his letter to me with pleasure and will have it published in *Schriften der naturforschenden Geselschaft*, of which a new number will soon be published.

Once more with love
Your
H. C. Ørsted

In the tall bookcase where the papers are, there is on one of the middle shelves a package of letters from Suell, where one can find the names of those who are to receive money from Suell after Bröndum. Ask my brother to be so kind as to issue the necessary instructions on the matter. I believe that Cremers is to go before all others once Bröndum has been paid. I ask you to send the enclosed instruction to Captain Hornbeck after having shown it to my brother. I also ask you to inform **Bröndum** about this.

München, December 28th 1822

Now I am finally here, dear Gitte, and I have received your always long-desired letters. Two were here when I arrived; I received the third yesterday, and there learned of Father's demise. He went to rest tired, and we should not lament. Had he not been so very weak and without the ability to take pleasure from life, I would surely have wished that he might have lived longer, and that I could have seen him again.

You will probably receive this letter 2 weeks later than the last since I have travelled farther from you in the meantime. My last letter was from Erfurt. There I told you of my meeting with Göthe; however, I forgot to ask you to give his regards to Oehlenschläger. I had another visit from Dr. Thon and a Dr. Osan on the day I left Weimar. The latter gave me what he had written. In Erfurt I visited Trommsdorff and Bernhardi, who did not edify me greatly. I came to Erfurt on the 17th and stayed the night, as a difficult journey over Thüringer Waldgebirge was ahead of us. If the frost had not made the road fairly passable, we would have had to make a considerable detour. The road from Erfurt to Ilmenau is very mountainous, one drives almost constantly up or down hills but, on the whole, climbs considerably higher. From Ilmenau, which lies at the foot of the mountain chain, one drives up a mountain road, which takes a couple of hours; one then has a worse road downwards to Schleusingen. We had to spend the night there. The next day we travelled via Coburg to Bamberg, where we again arrived late in the evening. The day after (Decemb. 20th) we travelled to Erlangen, which is only 5 miles from Bamberg. Here we visited the chemist Kastner, with whom we had dinner the following day, and Schelling, who

was not at home but visited us the following day and invited us for the evening. I spent several pleasant hours with Schelling. His house is very pleasant and his present wife very cultivated and interesting. I would not have praised his former wife so much. At Kastner's and at Schelling's I saw Schubert, Pfaff, a younger brother of the one from Kiel, Bougger a lawyer, Schreger a doctor, Heller a philologist, whom I knew from earlier days. We agreed to celebrate St. Thomas Day the next day in Nürenberg, where one makes a great deal of that day. We were to go there and lodge at the same inn where the professors from Erlangen had arranged to eat.

I thought quite often about my brother on his birthday, but due to a confusion of the days, I imagined that it was not until the day after and said so to Bindesböll. He mentioned this to some of the party on St. Thomas Day, and Kastner, who thought it was my birthday, drank my health on the occasion, but I corrected the mistake and thanked him on behalf of my brother so that he was properly toasted there.

We only stayed the night in Nürenberg and travelled the next day via Weissenburg to Eichstadt, where we stayed the night. We reached München the next day. On the journey we met the first adventure that we have had so far. Just outside Eichstadt we met a young woman who asked to ride with us. We gave her a place on the front seat. She was a little quiet at the beginning, but it was not long before she told us that she had run away from her parents the day before in order to avoid marriage to a man of 60, who she felt was not the man for a girl of 17. When she heard that we were going to München, she was immediately prepared to go with us, and when she later learned that we were going to Paris, she showed more than a little interest in making that journey, too. She wanted to appear inexperienced but betrayed at every opportunity that she had seen a thing or two. However, she explained this by saying that she had travelled to markets with her father, who deals in horses. She had also acted at Prince Wrede's palace, which is close to her home town of Weissenburg. She said that she had not been in München but knew enough about the area there that one could scarcely believe her. Assuming that she still might not be depraved, I strongly advised her to write to her parents and be reconciled with them, which

she promised but will hardly do; for she seemed to be heartily angry with her parents and not greatly afraid of the dangers to which an unprotected girl is exposed in the capital. However, it is time to leave this adventure, which must be more fit to amuse us on a boring day of travelling than those who hear about it later. She parted from us at the gate in München, and we have not seen her since. We arrived here late on Christmas Eve after having travelled 24 miles in two of the shortest winter days. My instrument from Frauenhofer was finished. I have spent every one of the four days that I have been here working with him. Among the acquaintances I have made is Yelin, who is the physicist at the Academy here and has shown me the equipment they have here, which consists mostly of old things but does contain a few beautiful things. There is a club here called *The Harmony*, where one plays cards, smokes tobacco, and drinks beer. I have contented myself with the last of these without overindulging, as you can easily imagine. In *The Harmony* I have become acquainted with a mining engineer Groner, who yesterday evening took me to a Dr. Gruithausen, whom he regards as a great luminary, but who lacks a solid scientific foundation. He does, however, deserve the praise that, with unflagging enthusiasm, he spends all that he can spare of his modest livelihood on scientific investigations. – This morning I visited **Reichenbach**, who is as healthy and cheerful a man as he is a great mechanical artist. He is a good talker, which is rare for this kind of virtuoso. He showed me the drawing for his great mechanical masterpiece, a machine with which he can raise salt water 1218 feet in order to lead it over a mountain to the place where it is to be boiled. – This evening Bindesböll and I are going to a party at Yelin's; the first party to which we have been invited here in München.

You see that I am telling you the story of my journey step by step. I know that it does not bore you, even if it is not in itself so interesting, if only you know how I fare. – Love to all the children from me. Tell Karen that she must soon write to me again. Tell Christian that Father will also have many beautiful things for him if he is really diligent[12]. Kiss Marie and Sophie for me. Love to Anders

12. Added in the margin: If Søren is diligent, he will not be forgotten either.

and Mathilde, your sister, Mother and all the others. Warm regards to Forchhammer from me. I think of him more often than he believes. He shall hear from me by the next post. – Be well, my dearly beloved Gitte!
Your
H. C. Ørsted.

[Added in the margin:] The next letters should be addressed to Paris *à remettre à la legation Danoise*. Ask Collin to arrange for a money order for me for 500 *species* in Paris; but preferably, if possible, by a letter of credit so that I can withdraw the money in smaller amounts when I want to. Do not delay. – Tell my good brother that I shall most certainly write to him from München. It is impossible today.

München, January 8th 1823

Dearest Gitte,
I am about to leave München and shall therefore give you a brief account of my stay here. I have spent most of my time with Frauenhofer, with whom I have not only witnessed his newly-devised experiments but also seen his marvellous workshop, where the most perfect telescopes anywhere are made. By repeating all his experiments here with the new instrument he has made for me, I have had the opportunity to see many advantages of practical optics that are known to only a few. Frauenhofer is a man who owes most of his success to his rare natural abilities. He had learned how to make mirrors but also wanted to learn how to grind spectacles. From there he went on to construct telescopes. But he soon discovered that this could not be done without mathematics, so he began to study this science with personal diligence and with some instruction from a scholar close by. When he was about 21 years old, he was recommended to Reichenbach to help him in his optical workshop. In the course of a few months he grasped Reichenbach's new ideas about grinding glass and added many new ones. His workshop is now arranged so completely after his own ideas that it really represents one great thought. He makes the glass for his telescopes himself and thereby greatly surpasses the English. He grinds the lenses in a completely new way. He polishes them with a machine which is

most ingeniously designed, and which is capable of correcting errors in the grinding. Whether lenses have their correct curvature is measured with instruments which have such perfection that one can trust them to # of one ten-thousandth of an inch. Nothing is left to chance, but everything is calculated so that the resulting instrument must be a perfect example of its kind. However, I feel that I am telling you too much that can hardly interest you unless you could see it for yourself. I shall now merely tell you something about the man himself. He is very quiet and modest for a famous and respected person. Although he was educated in workshops, he has good scientific knowledge so that he is even able to read books in Latin. – I have also become acquainted with Reichenbach, Frauenhofer's teacher. As is well known, he has spent the last 20 years improving the art of making astronomical instruments so that one does not regard anything of that sort as being perfect unless it has been made according to Reichenbach's method. He and Frauenhofer are undeniably München's most remarkable men. Although they are masters in almost the same subject, they do not at all resemble each other externally. Reichenbach, who is now about 50 years old, is short rather than tall, plump, full of passion, enjoys talking and does it well, in particular he explains things with great clarity. He likes external honours, has three or four orders of merit, and has in recent years abandoned the workshop to be the head of department for the road and waterworks. Frauenhofer, 36 years old, is a little over average in height, black-haired, a wise and thoughtful rather than passionate face, quiet, reserved, not seeking external honour unless it seeks him. – Among other excellent men I should mention Vogel, whom I already knew from Paris; a competent experimental chemist who has had a wonderful and well-equipped laboratory built. – **Yelin**, a vain and unreliable man who does not enjoy much respect here either. He has been very courteous to me; but I catch him all the time in falsehood and imprecision. – Dr. Martius, who along with Dr. Spix, has been in Brazil at the expense of the government, and who leads the natural history collection at the Academy. – A mining engineer Groner, who can talk about anything, and who took me to a Dr. Gruithausen, who lives quite isolated and with much sacrifice for his science, physics, but who unfortunately lacks

certain judgement. – Wiebeking, architect and active writer on architecture, has not been without interest for me. He has previously written a large work on water supply. In recent years he has occupied himself with works on the history of architecture and its influence on culture and taste. He has nothing about the history of architecture in Denmark other than the Danish Vitruvius[13]. The enclosed letter to Professor Werlauff might perhaps prepare the way for more information; otherwise our country will appear to great disadvantage in this history[14]. How have I lived in this city otherwise? To this I answer: Quite well; however, the climate is not good, and I have had a toothache several times. Some nights, there have been 14 degrees of frost. München lies 16 to 18 hundred feet above sea level and therefore has much less warmth than it otherwise should. Education and culture are not wide-spread here, nor are parties as almost all naturalists and artists are at war with each other. I have been to evening parties twice, once with Yelin and once, New Year's Eve, with Hr. v. Kersdorff, a cultivated landowner, who has been in Copenhagen. The food was meagre: slices of sausage, meat etc. with bread, beer and poor wine. What made the party enjoyable, on the other hand, was good singing by a Mr. and Mrs. Stunzer, and at Kersdorff's also an excellent Italian singer, who had a wonderful bass voice. It was New Year's Eve, and everyone waited for 12 o'clock. I expected to hear "Des Jahres letzte Stunde"[15] or some other beautiful song, but I was mistaken; everyone rushed out of their seats and shouted congratulations in each other's ears so that one rather believed that one was among children than among adults. I, however, thought about our dear home and the many memories of lovely New Year's Eves spent together. – I have only been invited to two dinners here, yesterday with Wiebeking, today with Reichenbach. Otherwise, I eat at the public table at the inn, where the food is good but the conversation poor; which, however,

13. *The Danish Vitruvius* (1746-49) by Laurids de Thurah (1706-59).

14. Added in the margin: Wiebeking has now received all the desired information from Bindesböll and does not require more.

15. New Year's song with text by Johann Heinrich Voss and melody by Johann Abraham Peter Schulz (1747-1800).

is not due to a lack of distinguished company. The men with whom I have daily talked at table for the last week are: A Prince **Hohenzollern**, whom I sit next to, a Count Buttler, a Baron Closen, a Baron Streit, a Baron Hornstein and an actor and theatre director Carl. The Prince is sensible and good-natured, a good table companion; Count Buttler says little and seems to be stupid and proud; Closen is a business man and seems to be the brightest of them. Streit is a great aristocrat, Hornstein a cheerful, open-hearted but very sensuous epicurean, Carl a good actor but awkward when he is not talking about love affairs. Plays, of which one seldom sees anything of value here, balls, masquerades, and love affairs are the main subjects of the conversations, which only now and then are spiced with a little disputation, which I like to introduce.

There are three theatres here. The large theatre is big and well appointed. It is almost new. The machinery there is excellent. I have not yet seen the inside of the opera. Sometimes they sing in Italian what have been written in German and composed by German masters. Recently one heard them sing the old song made famous by Mozart's music: "In diesen heilligen Hallen" in Italian to great applause. The smallest theatre, outside the Isar Gate, performs tragedies just as the large theatre; but the large theatre also gives performances that would be relegated to Casorti at home. I recently saw a pantomime, called *The Silver Snake*[16], in which Harlequin and Pierrot played the principal parts in a piece so incoherent that one would have thought that such an invention could not be tolerated in a country's leading theatre. The machinery was magnificent and far exceeds anything we have seen in Copenhagen, but Harlequin and Pierrot are much below Casorti's. Here in Germany I have not yet succeeded in seeing one of the nation's masterpieces in the theatre.

Of countrymen, I have in München met Engraver Bagge, Engineer Thiele, Lieutenant Krossing, who applies himself to lithography. At the lithographic works I have found a Mr. Flachenecker, who has spent a long time in Denmark and speaks Danish well.

16. *Die Silberschlange*, a new pantomime by Friedrich Horschelt (1793-1876), performed on January 6 and 7, 1823.

And now, good-bye for tonight, sweetest Gitte. Love to all our children. Karen must write to me again soon. Søren may write to me as soon as he has regained his old place in school; then he shall see that I also think of him. Tell Christian that if he remains diligent and learns something every day, he shall be rewarded when Father comes home. Love to Marie and Sophie from me; and congratulate Sophie on her birthday, which will have passed when you receive this letter. Regards to your sister, Mother and Bodil etc.
Your H. C. Ørsted

This letter did not get to the post on time. So I have had to take it with me and have since spent 3 days travelling. I have passed Augsburg, where I was for half a day and met the chemist Dingler, who publishes a journal of applied chemistry[17]. We stayed the night at Ulm after the second day's journey. At supper we talked with an architect and some other educated men, among other things about physics, and the architect said that now we also had a physicist in Denmark who had made great discoveries, in which connection he mentioned my name. Bindesböll was not slow to tell him who I was, and this started a very lively conversation. Late last night we arrived in Studtgard, where we shall remain until tomorrow. I have to close now in order to avoid the same fate as last time. Be well, my Love.
Ø.

[Added in the margin:] Studtgard, Jan. 13th 1823. Thank you for your dear letters. I received one on the last day in München.

To Anders Sandøe Ørsted:

München, January 9th 1823

Dearest Brother,
Although I have not sent you a letter from the time when I had crossed the Belts until now, I still hope that you have received enough letters from me in that Gitte has shown you my letters to her. I hope that you do not require my assurance that I have also

17. *Polytechnisches Journal*, published from 1820.

thought of you with every one of these letters. In the midst of all of the distractions with which the journey surrounds me, my thoughts return every day to my dear home, where my beloved brother is certainly not my last thought. I have frequently had the pleasure of talking about you with German scholars although I only occasionally meet with jurists. Even philosophers I only meet now and then, like Schelling, about whom you will have seen something in **Gitte's** last letter. Schelling still occupies himself, as in the last 10 years, primarily with investigations of the most ancient wisdom, such as is offered to us in mythology and other relics of antiquity. He promises that we shall soon have his "Vier Weltalter"[18].He does not occupy himself much with *Naturphilosophie*. He was of the opinion that he could not usefully return to it until one had some more discoveries in which one could find part of the essence of Nature written in Gothic script, such as my electromagnetic discovery, he added very courteously. As soon as I have the opportunity, I shall read his philosophico-mythological treatise[19], which appeared some years ago, but whose title I do not recall at the moment.

Among all the places that I have visited in Germany, Berlin is undeniably to be preferred, no matter what its enemies say against it. This city has a significant number of excellent scholars, and moreover one finds in all classes, and particularly in the civil service, an unusual degree of enlightenment. In all public institutions free of certain recent political prejudices, one sees the rule of law. Only the agitation of obscurantists has a confusing influence; but in conversations with calm and unprejudiced men I have learned that all the hideous rights which a decree has given to Minister Altenstein remain unused. One feels everywhere that they do not dare to introduce barbarism in Prussia. However, everyone is uncertain about how far they dare attempt to go. I was still in Berlin when the news of Hardenberg's death arrived and had the opportunity to note that people did not hope for any improvement as a result, but were rather in fear. – In Bavaria people speak freely but have not yet detected

18. Schelling's planned work *Die Weltalter* (1811-15) on the past, the present, and the future was never completed.

19. Probably *Über die Gottheiten von Samothrake* (1815), planned as part of *Die Weltalter.*

many fruits of the Constitution. The Concordat with the Pope is said to have done more harm than the Constitution good. Its best aspect, in so far as it has borne fruit, is that it has suspended many of the effects of the Concordat. The most important complaints about the Constitution deal with the incompetence of the representatives. The lower of the two chambers always objects to expenditures for the advancement of science. Among other things, people have spoken a great deal about the costliness of the Academy. This institution does cost 85,000 guilders annually; but this maintains the natural history collection, the collection of physical instruments, the chemical laboratory, the botanical gardens. In addition, the paid members of the Academy are required to give lectures and carry out such tasks as the government assigns them. As an academy, this institution does not accomplish very much, mostly due to dissension among the members. I have nowhere detected such a poor understanding among scholars as here. In order to satisfy those who complain about the costliness of the Academy, they are now considering moving the university in Landshut to München and using the most competent of the members of the Academy as teachers. I think this will be beneficial, but it is bad that the University is now given its third location (it was previously at Ingolstadt)[20] within a period of about 20 years. Much is being done for the arts in Bavaria as the Crown Prince[21] is a supporter, especially of architecture. So many magnificent buildings are being built here, and so much emphasis is being placed on beautifying the city, that I can only believe that this will have a very damaging effect on the finances of the state.

I have hardly anything of scientific interest to tell you except for physics. No great genius in poetry or philosophy has appeared in Germany in recent times. It does not go particularly well in experimental natural science either. Berlin has its good men in the field: Seebeck, Erman, Mitscherlich, Heinrich Rose; but from Berlin to München, on a journey of about 90 miles, where I have passed

20. The university was in Landshut from 1800 to 1826 with the name of Ludwig-Maximilians-Universität.

21. Later Ludwig I of Bavaria (1786-1868), King 1825-1848.

through three university towns, I have not found one decent chemist or experimental physicist. Schweigger in Halle has a good mind and is a well-read man, but he is also a straw blown here and thereby the wind. His experiments mean little. Meinecke, his co-publisher of the chemical and physical journal[22], has published no experiments of his own. Steinhauser, who is known for work on terrestrial magnetism, is as good as crazy. Döbereiner in Jena produces some quite good things among a great many incorrect things. Trommsdorff in Erfurt writes new books every year by copying known German works. Kastner in Erlangen writes thick books which have been painstakingly collected but without judgement. Yelin in München experiments indifferently and lies a great deal. On the other hand, I have found Frauenhofer in München to be so instructive that I have been able to occupy myself profitably for two weeks.

Has Privy Police Councillor Martin sent you the book he told me he would send, and about which I wrote to Gitte?

Before I close I must thank you again for bearing the full burden of all the considerations which must be shown to the family as a consequence of Father's death, and which I would willingly have shared with you if I had been there. How much I would have liked to have been present in his last moments; however, I must take comfort in the thought that he lacked for nothing, and that recently he had scarcely been able to derive any distraction or pleasure from the presence of his nearest and dearest.

Give my regards to your good Mathilde and tell her that I shall remember her commissions in Paris. When you see Collin, give him my regards and tell him that things go very well with Bindesböll on the journey. Give my regards to Mynster, too. But first and last, my most heartfelt regards to you and your Mathilde
from your devoted brother
H. C. Ørsted.

22. *Journal für Chemie und Physik* (1811-28).

To Inger Birgitte Ørsted:

Studtgard, January 14th 1823

Dearest Gitte,

Yesterday I sent you a long letter; today I again take pen in hand to tell you what I have heard and seen during these last two days. In the letter I sent you yesterday, I mentioned nothing about Studtgard except that I had arrived there; the departure of the post forced me to this brevity. However, I had already had some enjoyable hours here. These were found not among scholars but with the art-loving brothers Boisserée. They, or rather the elder of them, have published the splendid depictions of the cathedral in Cölln[23]. I believe that I spoke of them in connection with Goethe, who had the first pages of them and showed them to us; but here we also saw the drawings for the copper-plates that are to come. You will perhaps be surprised that one publishes a complete set of copper-plates to depict a single church, but this one richly deserves it. It is the proudest memorial to the so-called Gothic, or as one now thinks it more correct to call it, German architecture. It is true that this building has never been finished, but what has been completed is admirable, and by luck the drawings for the entire building have been preserved. If it had been completed, it would have surpassed the Egyptian pyramids in grandeur, and yet in all of its parts been as detailed as the most perfect carving. In two very large copper-plates the church is presented to us as it is and as it should have been completed. But these two depictions would still only have given an imperfect sense of this extraordinary work. Each part of it is so detailed that one can only show all that is to be seen there with the aid of large plates. Thus, one has a separate plate to give an impression of the artistically painted windows. Another serves to show the cross-sections of the various columns which are as if composed of bundles of thinner columns, whose arrangement gives rise to[24] the most varied forms which, however, have a general harmony in spite of their dissimilar-

23. *Geschichte und Beschreibung des Domes von Köln* (1823).

24. Here HCØ has crossed out: the most beautiful distribution of light, in that the illuminated elevated parts cast light into the lower and thereby …

ity. Other plates display the entire interior of the church, the church seen from the main entrance, individual parts of the exterior of the church. The columns that decorate the church wall outside are designed as upward-reaching towers or spires, and each one of them would be a quite considerable church steeple; for they have a height of 150 feet, that is 38 feet more than the height of the Round Tower[25]. The windows have a height of 50, and thus all the rest in corresponding giant size. Just think of this enormous mass as a single fabric of ornamentations, and you will have at least an idea of the immensity of this work; but think of it also in all its parts as a harmonious entity, like the expression of one great idea in the richest variety of distinctive features, and you must feel how remarkable the master must have been. However, descriptions say all too little: perhaps I shall one day be so fortunate as to be able to show you this magnificent collection of pictures, which should be accompanied by a work on old German architecture. – As important as this scientific and artistic enterprise is, the brothers Boisseré are far more remarkable for something else; in old churches and monasteries on the lower Rhine, they have been able to track down a treasure of paintings from an age when one hardly believed that Germany had any art. Their valuable art collection is now exhibited here in a building given by the King. One finds paintings from the 14th century which are already exceptional. People are painted on a gilt ground without any background of landscapes, buildings or other surroundings. The figures are somewhat stiff, but the faces noble and expressive, the clothing as in Greek works of art. Everywhere here one believes that painting has developed from works of sculpture. It is regarded as reasonable that the art of painting has come from Greece to these lower-Rhenish artists. Since there are old chronicles that mention a Wilhelm of Cölln[26] as an unequalled painter who could portray anyone as he was, they assume that the oldest works found here are by him. His paintings are still in water-

25. The Round Tower in Copenhagen was built (1637-42) by King Christian IV and is approximately 35 metres high.

26. Presumably Wilhelm of Herle, born in Limburg (Holland) and active in Köln for 15-20 years from 1358.

colour, although later coated with an oil varnish. After him came Johan von Eik, to whom one attributes the invention of oil painting. He was born in 1380 and is said to have painted his first work in oil in 1410. One of his works, which came to Naples, generated so much admiration that two Italian masters travelled to Germany to learn the art from him. When seeing his works shown here, one would not believe that he had lived and worked before Raphael's teacher[27], and one is surprised that **Albrecht Dürer** could so long have been called Germany's greatest painter. Describing paintings is difficult, and yet I cannot refrain from telling you something about a couple of them, whereby you can gain an impression of them all. In one painting, which depicts the birth of Christ and the Magi who worship him, one sees the crib covered only by a thatched roof borne by four posts; but in the background one sees through them the town of Bethlehem, surely more magnificent than it ever was, but precisely therefore a magnificent contrast to the humble place where Christ was born. **Raphael** chose a child of two or three for his Christ Child, and surely with some discrimination as a new-born child still lacks beautiful form and sensible expression; however, this artist has successfully depicted Jesus as a new-born child with a wondrously wise face, quite as if one imagined an expression of spirit put on the face of a new-born child. The Magi are portraits but certainly idealised. The first is said to be **John the Good**, Duke of Burgundy, the third in distance from the Child **Charles the Bold**. The former is kneeling before the Child filled with faith and reverence, the latter seems to be dissatisfied with the humble surroundings. One can hardly imagine a prouder and bolder face. Everywhere in **Johan von Eyk's** works one sees faces which he has probably taken from real life but much ennobled by putting a higher expression on them, just as **Raphael** usually did. Thereby the paintings of both acquire a high degree of realism without stooping to a common realism, from which the spiritual expression and the purer beauty that the artists have given the faces and the poses preserve them. Later academic artists in Italy, and afterwards in other countries, attempted to create pure ideals but lost the strong presence of nature as a

27. Pietro Perugino (1446-1524).

consequence. Our artist's glorious colours are quite admirable. The colours have an extreme purity and clarity which would give no reason to suppose that they have endured the effects of light and air for 4 centuries. One assumes quite reasonably that this comes from the fact that they used to paint on a chalky ground made with size-water, whereby the oil in the colours is partially absorbed, and the white ground must keep the colours bright. **Johan v. Eyk** has founded an entire school in which **Hans Hemling** [Memling] in particular distinguished himself. Among those who successfully followed in his footsteps was also one Schonedrel. I cannot now recall what belonged to each of these masters, but I can recall many of the paintings; however, I shall only describe one for you: the angel's Annunciation to Mary that she will bear Jesus. This event has been presented in many different paintings, and even in this collection in more than one way; but the one which pleases me most of all shows us Mary in devotion with a book before her. The angel enters with the Annunciation, but between them stands a magnificent white lily. Beautiful sunlight shines through the window, and the Holy Ghost hovers in the rays in the form of a dove. It is remarkable that the lily here is shown without its organs of fertilisation even though, in another painting representing John the Baptist, it is painted whole. Naturally, such thoughts do not determine the excellence of a painting, but what the art of painting should achieve is not missing here either. Mary's noble innocence, the purity of the angel, the poses, the glorious colours, the material and the folds of the clothing all testify to the excellence of the painter. I shall not tire you with further description, I shall only tell you that a very unusual part of the world of art is hidden in this collection. I really wanted to have you here so that you could also see it all; but since that would require you to be moved 200 miles, I must content myself with giving you this pleasure second-hand. There are quite fine lithographs of some of these paintings; I shall send them to you. You will surely be pleased with these beautiful works, and they will decorate our home very nicely. In March, you will receive 18 such pieces, and we shall probably be able to get the rest as they appear. Naturally, such costs are not to be taken from travel funds but from our own. These 18 lithographs come to 90 guilders, about 80 Rd in paper currency;

but as I know that you wanted some really beautiful copper-plates for our rooms, and these are as beautiful as excellent copper-plates and do not cost 1/6 of what equally good copper-plates would cost, I hope to have made a good buy. Thorwaldsen likes these lithographs so much that he has them all hanging. The next three lithographs to appear will be accompanied by a description of them all so that one will also get a history of old German art.

I had little contact with scholars in Studtgard in the two days I was there. I visited Kielmeier and had a return visit from him, but the good fellow was not very interesting. I paid a visit to Doctor Jäger, the physician-in-ordinary, but did not find him. As his fiancee was dangerously ill, I did not see him. At the inn I met three mining officials, with whom I saw the natural history collection, the paintings, and a comedy. One of them lived in Studtgard and is named Schübler, the other two Jugler and Baron Grothe were Hanoverians. The comedy was by Kotzebue, full of madhouse noble-mindedness and wicked tricks.

Strassburg, January 16th

I have once again completed two days' journey and am now in Strassburg, from where I hope to go to Paris the day after tomorrow. Yesterday I passed through Carlsruhe and immediately visited Professor Wusherer in the evening and thus convinced myself that it was not worth my while to stay a day for his sake. I have already paid one visit here, that is, to Apothecary Hecht to learn what I could do here. – The journey to Paris will last about 5 days so that I can be there on the 22nd. I do not doubt that you have requested the money order for me there of 500 *species*, and that I shall find what is needed when I get there. If you do not know with certainty that the letter of credit or the bills of exchange have been sent, please make enquiries; otherwise, I shall get into great financial difficulties.

I often think of you and the children, especially with regard to the cold. It has been very hard in Germany; I hope that it has been milder in Denmark. It froze in München while I was there, down to -14°, in Studtgard, where vines can grow, -13°. However, I have felt well all the time. – And now farewell for this time, sweetest Gitte.

My love to all the children, Karen, Christian, Marie, Sophie, Søren and to Anders and Mathilde, Mother and Bodil, your sister and her children. Tell Forchhammer that I shall certainly write to him from Paris. It is more difficult than anyone would imagine to write all the letters one would want to while travelling; for when I have written to you after a strenuous journey, it is impossible for me to finish anything else! Once again, love from your
H. C. Ørsted.

Paris, January 25th 1823

Dearest Gitte,
Now I am here in this so-called capital of the world. I stayed in Strassburg for only 1 ½ days. I visited Apothecary Hecht, Professor Herrenschneider and Professor Branthome. They were most obliging to me. I saw their beautiful collection of natural history, which in many respects can be considered among the best. Unfortunately, it must be moved now in order to make room for monks, who had possession of this building 30 years ago. I saw Professor Herrenschneider here 20 years ago, and he well recalled the conversations we had then. He asked me many questions about electromagnetism but did not seem very deep, neither there nor in other parts of physics. The road from Strassburg to Paris was very difficult this time because of snow, at least the first two-thirds of the way, so that it was not advisable to travel by coach, which runs both night and day. There are many examples of these elephantine wagons being overturned at night and coming to harm. Moreover, we could not easily leave our carriage in Strassburg as I want to take the shorter return route across Holland. We left Strassburg on the morning of the 18th. At midday we hungrily enjoyed an excellent meal at the quarters of the royal stagecoach in Pfalzburg, where the landlady addressed us as a compatriot. She is a Miss v. Eiben, whose father was Chancellor in Glückstadt. She said that her husband had been in Holstein as a French captain but had now settled here in peace and quiet. I shall leave it undecided whether he stood so high in his war service; it is certain that she was an excellent landlady, and not expensive as is otherwise a major shortcoming with the French landlords on the road. That night we had to stay at an inn for men

in Blamont, where the landlord, however, was rather enlightened and talkative in a good way, the bedroom clean. On the second day we came through Nancy and in the evening reached Toul, where, on the recommendation of those who inspected our passports, we took lodgings in *le Temple de la Paix*, which admittedly was clean, but which was the poorest inn that I have seen; for they had hardly anything there: One could not even get coffee in the morning. The following evening we reached St. Dizier, where we got very good quarters for the night. On the way we met an equipage with a black servant in magnificent furs. There were two ladies in the carriage. We later learned that it was a Countess Thibaudeaux. She had us asked where we intended to spend the night and offered to drive in front of us. In the evening she had us asked at what hour we would leave in the morning. I answered without ceremony that we would leave at 6 o'clock, and that I advised the Countess to do the same. In the morning, when we heard that she was getting into her carriage, I went out and accompanied her and thus made her acquaintance. She was accompanied by a young lady of her family, who was quite beautiful except for the fact that she had a considerable beard, at least like that of a young man of 17. She is called Jena Thomé, is 18 years old, has long been in Vienna and speaks good German. We dined together at Chalons and met again in the evening at Epernay. Here the Countess told me that her husband is among the exiled and has lived for 8 years in Vienna, where her son has settled and runs a business. Her husband has a very famous name from the early days of the Revolution and resigns himself to his fate, as she put it, with great equanimity. He had been Prefect, State Councillor and *pair de France*; now, however, he amuses himself with translating German works and with other such scientific activities. She invited us to visit her in Paris, and she and Mlle Jena promised to teach Bindesböll French. From St. Dizier the road began to be good, that is, free of snow; but it is very hard on the carriage because it is cobbled. However, our carriage held up very well, but nevertheless we were forced, at every major station, to tolerate a siege of blacksmiths, who surrounded the carriage and wanted to find all sorts of faults to repair. One really had to chase them away in order to prevent them from doing the damage which

they wanted to repair. In the same way, carriages are besieged on the last 20 miles to Paris by landlords and landladies, who offer to bring all kinds of food to the travellers. If one wants some work from the blacksmiths or some refreshment from the landlords, one must not forget to agree on the price first; for otherwise one must pay excessively. One reads so much in the papers about wolves which have attacked travellers on the road and eaten them; I assert that this is merely a poetic invention to describe the two-legged predators I speak of here. By the way, you must not think that I have been in danger from four-legged wolves on my journey, for they attack only those on foot; on the other hand, I have not quite been able to avoid the bite of the two-legged ones, as you can easily imagine. But back to the journey. At Meaux our ladies were met by Parisian friends, and we arrived in Paris in the morning of the 23rd and went to one of the many hotels in the vicinity of the Palais Royal. The hotel is called *Hôtel d'Autriche*, in *rue traversière*. Before we had anything taken from the carriage, I viewed the rooms and agreed on the price. I asked the price of two small rooms. 12 francs per day, the woman answered. I immediately declared quite candidly that I would only give 6, and the matter was decided. Later I saw that I had been too hasty as these two chambers were almost useless without an adjoining room. When I made the remark that this circumstance would soon drive me away again, we were given the room at no cost. However, I am forced to take lodgings elsewhere, that is *Hôtel de l'empereur Joseph* in *rue tournon* in Fauxbourg St. Germain, where the men and the things that are of greatest importance to me are to be found. We shall move tomorrow. – I have not yet paid many visits. Heiberg, v. Schmidten, our Legation Secretary Coopmans are the only ones so far. From Coopmans I have received a letter from you, and I am glad that all seems to be well. I trust that the children's indisposition is as insignificant as you describe it. My love to all of them. Karen, Christian, Marie, Sophie, Søren. Tell all those who can be diligent that they must endeavour to learn a great deal before Father comes home.

Before I end, I have to tell you that it is very unpleasant in Paris these days because of the bad weather. It was freezing until yesterday, and they have really had a hard winter here. Today it is thawing

quickly and raining as well. It is almost intolerable to walk in the mire of the streets, and it is not even worth driving because the roads are so slippery. I expect that everything will be better tomorrow. – I have received fine letters of introduction from Prince Christian, which I shall begin to deliver tomorrow.

If this letter is a little boring, please excuse it because it describes a rather strenuous and tiring journey and a couple of boring and tiring days here in Paris. I cannot enjoy myself here until I have settled down, which I hope will happen tomorrow morning. Neither am I completely rested after the journey, so I shall end for this evening.

Regards to Anders and Mathilde, Mother and Bodil, your sister and her children, Forchhammer and Zeise, Winckler, Sibbern, Jacobsen, Rosenvinge etc. Be well, my beloved Gitte, and continue to write to me often.

Your
H. C. Ørsted

Today, January 26th, I moved to a very beautiful hotel, called *Hôtel de l'empereur Joseph, rue Tournon, auprès du palais de Luxembourg*. The rooms are bright and clean, the furniture handsome and, best of all, the part of the city where it is situated is very beautiful. I thereby have the additional advantage of living close to most of those I want to speak with.

From BerIin I sent the necessary instructions regarding the money from Suell's auction. I forgot to mention then that I must pay 33 Rbd in paper currency in addition to what I have got at the auction. You will recall that I received this money for selling a few books but spent it as there was no need for it at the moment.

I forgot to write from München that croup is very wide-spread and very bad there. The chemist Vogel told me that they have had considerable success against it by first using an emetic, followed by medicinal leeches on the neck, and finally mercury. As his children had a predisposition for this illness, he always had emetic in the house and medicinal leeches in the cellar, for these remedies must be applied immediately. If the illness appears at night, one must absolutely not delay using the remedies until

morning. As this illness could easily manifest itself more frequently in Copenhagen after such a hard winter, I would not want to fail to mention it even though our doctors will probably also know about it.

Paris, February 7th 1823

Dearest Gitte,

No matter how great a desire I have to write to you, or I could say: no matter how great a need I have to write to you, I often find, when I get to it, that I am limited to a very short time so that I must write with the greatest haphazardness to let you hear something from me. It is true that you often receive long letters, but I do not have the time in them to tell you all that I would like to. I have particularly little time today; however, I must attempt to give you a superficial journal for the time which has passed since my last letter. On Monday, January 27th, after having delivered the letter to you at the post office, I visited Cuvier, to whom I had a letter from Prince Christian. He was very courteous and extremely dignified. He has taken great pains to become the Grand Master of the University, which had made him an Excellency and given him perhaps 200,000 francs in annual income; they even say that he has shown himself to be inclined to adopt the Catholic faith if he could reach his goal. This man, who is otherwise distinguished by insight and eloquence, has lost much of his esteem as a result. On the same day I was also at the Institute by appointment with Cuvier. After I had sat down among the listeners, one of the officials of the Institute stepped forward and announced: Mr. Ørsted from Copenhagen is here, and he is requested to sit with the members; which I did. I ate dinner with Chevreul, alone with his family. He has a quite beautiful wife and a very beautiful but somewhat sickly boy. On the 28th I went to Chevreul's laboratory in the Jardin des Plantes and showed him, Frederik Cuvier (the Baron's brother but no snob), and Geoffroy de St. Hillaire my experiments on the compressibility of water. I then visited Ampère, who was extremely excited to see me, and Fresnell, who lives in the same house and has become famous for his experiments on light. He is a young man of great genius. On the 29th I visited a Marquise d'Argence, to whom I had a letter from Prince

Carl[28]. She is an old invalid woman with a great interest in the sciences. Prince Christian had also written to her about me. Afterwards I visited Gay Lussac and Thenard and ate dinner with Nicollet, an astronomer, to whom I had a letter from Prince Carl. In the evening he took me to a party at the home of de la Place at his request. He spoke with me in a most cordial and affable way. He is an old gentleman in France just as Goethe is in Germany. Like Goethe, he has raised himself to a high rank in society, he is a Marquis, and has held very high posts of honour; however, I believe that he is of noble birth. It is true that there is an enormous difference in their fields since one is a mathematician and the other a poet, but each of them in his field has had an excellent influence on his nation and on the world. Both have a comprehensive intellect. Just as Goethe's poetic genius extends into science, de la Place's mathematical intellect extends into philosophy and eloquence. Even if one is reluctant to subscribe to the opinions of one in natural science and of the other in philosophy, these excursions beyond their original boundaries still illustrate their great intellect, and the thoughtful man in the field will make use of the many glorious hints they have given. He spoke a good deal to me about my experiments on the compressibility of water and expressed his wish to see them. When we spoke about my theory of heat, we agreed that I should come to him in the morning of the following day. I did not succeed in convincing him, which was hardly to be expected since he has had a different view for almost half a century and thought and calculated with it; on the other hand, I had the advantage that he made the first important objection to my theory, which has been known for more than 10 years: And this objection will give me the opportunity to bring this theory to greater perfection. I ate dinner with him yesterday and enjoyed one of the most pleasant days here. The company is exquisite, as could be expected. On the first evening there I met Dupin, an excellent mathematician and a great expert in its applications not only for civil life but also for the army and the navy. He also distinguishes himself as an eloquent writer. I also saw Ramond, who has lived as a prefect in the Pyrenees for many years and has

28. Prince Carl of Hessen (1744-1836), Frederik VI's father-in-law.

contributed much to the description of the nature of this region as well as to the advancement of natural science in general. His work on the measurement of heights with a barometer is important. Yesterday I saw Fourier there, an excellent mathematician who is now one of the secretaries of the Institute since De Lambre's death, and Machendy, a superior experimenter in physiology. The conversation with them and with de la Place was of great interest to me. After dinner I had a long discussion with them about French literature, which they have studied with much insight. My preference for Pascal immediately made them expansive, and Fourier remarked that it was greatly beneficial for the French language that the current form of its prose had been shaped by a mathematical genius. But I fear that I shall lapse into writing a book if I insist on reporting conversations. I shall only add that, with all the friendly intercourse that I enjoy on this journey with the greatest men in Europe, I often apply Goethe's motto to myself: "Was man in der Jugend wünschet, das hat man im Alter die Fülle"[29]. And I must consider myself lucky that I must take this use of "Alter" in a broad sense, and I would hardly dare use it if I did not recall that, twenty years ago, I saw the same places and, to some extent, the same men as I now make new acquaintance with.

The post is leaving. I must close. Love to Anders and Mathilde. Give my love to Karen and thank her for the letter, she shall soon receive an answer. Love to Christian, Marie and Sophie. Love to Søren. Do not forget your good sister and her children, and thank Theodor for his letter. Love especially to you from your
H. C. Ørsted

You will definitely receive a letter again with the next post. NB to the extent that I have anything to say about it. Forchhammer and Petersen shall not be forgotten. Regards to all good friends.

Paris, Febr. 12th 1823

Dearest Gitte,
On the last post day I had to end my journal after having recounted the events of a couple of days. I now take up the pen on the day

29. What one desires in youth, one will have to the fullest with age.

before the departure of the post in order, if possible, to tell you something more. However, I see that I must endeavour to be briefer in my Parisian journal if I am not to fail.

On January 30th I visited Blainville, who received me in a very friendly manner like an old acquaintance. We spoke at length about Jacobsen, to whom he sends warm regards. I ate dinner with Arago, an excellent physicist, mathematician and astronomer. Gay Lussac, Ampère, Bouvard, a well-known astronomer, Mathieu, ditto, and others were there. Chevreul, who was previously one of Arago's best friends, was not there; for they have become enemies because Arago wanted to admit the mathematician Fresnell to the Institute as a physicist, a place which the chemist du Long seeks so that he can then make a place available for Chevreul. The entire dispute has had the least desirable outcome; for Du Long has been admitted in physics, but an insignificant chemist, Darcet, has received the free place in chemistry.

On the 31st I visited the *Conservatoire des arts et metiers*, a very large institution. Every kind of model that could be collected in every field of the mechanical arts is to be found here in a very extensive building, which previously belonged to an abbey. I was there with Bindesböll. We saw only a very small part of it in the few hours we could spend there. We later heard a lecture by the famous Dupin. He writes with great eloquence and apparently with great ease, but I found it strange that he read the entire lecture from his text, except for a few small remarks. Otherwise he performed this reading with great skill. The same day we visited Countess Thibaudaux, with whom we had travelled.

On Febr. 1st I had lunch with Biot, who shows me great friendship. His wife, who has translated **Fischer's Physik**[30], takes a lively part in the conversation. She is an entertaining woman. From Biot I went to Marquise d'Argence. In the evening I was with countrymen at the home of Lieut. Rothe, who has his wife with him, and with whom they assemble every Saturday evening, although for a very French gathering without food.

30. *Lehrbuch der mechanischen Naturlehre* (1805) translated to *Physique mécanique* (1806) by Gabrielle Biot *née* Brisson (1781-1851).

On February 2nd I visited among others Arago and Nicollet at the observatory and otherwise worked at home. I see that it may often seem from this journal that I have allowed an awful lot of time to pass by unused. I shall therefore note once and for all that I am often forced to work at home, that I often lose significant time in visiting people in vain, and finally that I often forget to note where I have been, especially when it is not important. I could thus easily leave out many days; but I know that my Gitte enjoys being able to follow me everywhere, and therefore I permit so many insignificant details to creep in.

On the 3rd I visited Malthe Bruun, to whom I had a couple of books from Schou. He was very entertaining and invited me to dinner next Sunday. I then went to Rougemont and got money and to Monnot, who was previously a Reformed minister in Copenhagen, in order to deliver a letter. I next went to the Institute, where I found among the listeners Charpentier, with whom I had been such good friends the last time I was in Paris. We took great pleasure from this chance meeting, which I had so little expected as I knew that he was the director of the salt-works at Rex in Switzerland.

On the 4th I had dinner with Ampère, where I met Arago, Fresnell, Chevreul, Du Long and others. The conversation was mostly about scientific matters, and I had a long debate with Ampère about magnetism. He is a very inept debater and understands neither how to grasp properly the reasons of others nor to present his own; nevertheless, he has a profound mind.

On the 5th I went to Thenard's lecture in order to hear him talk about his own discovery regarding the combination of water with a large quantity of oxygen[31]. The experiments undeniably went well; but at home we would have been greatly offended by hearing an inventor talk about the importance of his discovery so often and in such strong terms. I ate dinner the same day with de la Place, and in the evening I was with Biot, of whom I had occasion to speak in my last letter.

On the 6th I spent most of the morning with Fresnell, who showed me his experiments. Fourier and Ampère were also there.

31. Thénard discovered hydrogen peroxide, H_2O_2, in 1818.

Fresnell is one of those who have made the most important discoveries about light in recent times. He is still a very young man and unfortunately has a weak chest; but if his body may be entirely too mortal, his spirit is all the more immortal.

On the 7th and 8th I was mostly at home in order to study Fresnell's review of recent discoveries in the theory of light, which can be found in the supplement to the French translation of Thomson[32]. However, I also went to Thenard's lecture one more time and to the Marquise d'Argence. Thenard's lecture hall is a large amphitheatre which can hold more than 1000 listeners, and which is almost always full.

On the 9th I had lunch with Brognard, whose father-in-law Coqueberd de Montbert understands Danish and is quite familiar with Danish literature. Brognard is well-known as a mineralogist and is also the director of the royal porcelain factory at Sevres. His son is publishing a work on fossil plants[33], for which I have promised him what I can get for him from home, particularly ferns from Bornholm shale. I shall write to Forchhammer about this. I went to dinner with Malthe Bruun, where I was in the company of Chaumette des Fossées, who is the Swedish consul and a member of the Icelandic Society in Copenhagen. He has an entire collection of Icelandic works and seems to understand Icelandic well. The party was much larger in the evening but consisted mostly of scholars outside my field, with whom, however, I had quite lively conversation. Among them was a man who was born of Greek parents in the Orient, and who speaks Arabic like a native. He told us many interesting things about Arabic literature and showed, among other things, the impossibility of making a true European (at least French) translation of it. His name is Jagoub. He has also made himself known as a French poet.

On the 10th I visited Ampère by appointment to see his experiments. He had invited quite a few people for this. I found there Doctor Sariset, Fredr. Cuvier, the mathematician Puissant, two young mathematicians, Babinet and Montferrand, who have both

32. *A System of Chemistry* (1810) translated by Fresnel (1822).

33. *Histoire des végétaux fossiles* (1828-37).

written about Ampère's experiments. He had prepared three large galvanic cells, his tools to show the experiments are very complex; but what happened? Hardly any of his experiments were successful. It was only after several of the listeners had left that he finally succeeded in performing a few of them. He is terribly confused and just as inept an experimenter as a debater. If he did not devise his machinery in such a complicated fashion, he would be less unfortunate in his experiments than he is. Later I went to the Institute, where nothing of any note occurred except that I had the pleasure of attending a secret meeting, from which visitors are otherwise excluded. The discussion was only secret to the extent that it concerned economic matters, namely the inheritance of several hundred thousand francs, which the Institute had received from a Mr. de Monthion, and whose utilisation was discussed here. This Monthion was very sickly in his early years and did not expect to live long. He therefore put all his money into an annuity and got a very large annuity from it. However, he recovered and lived to be 82 so that he became rich from his immense income. He left 16 hundred thousand francs, most of which he willed to scientific use.

On the 11th I ate lunch with Chaumette des Fossées along with the elder Desaugiers. He received me very amicably, and we talked a great deal about Denmark. I ate dinner with Chevreul, who later read part of a work he is going to publish about fatty substances[34]. One might easily imagine that a book about butter, pork fat, whale oil, oil, soap etc. could not be interesting, but he has dealt with these matters like a true naturalist and derived important results from them. The work will certainly be to his credit, but unfortunately it is not written with French elegance and charm even though the style in itself is clear and good.

On the 12th, in the company of Charpentier I saw part of the royal collection of minerals, which is under the supervision of Count Bournon, from whom the King has actually purchased it as a reward for his fidelity to the royal party. In the evening I was with Jomard, where I saw many new faces, especially people who are in geographical studies and language studies, e.g. the orientalist Lan-

34. *Recherches chimiques sur les corps gras d'origine animale* (1823).

gles, the famous traveller Culliaud and others. I also saw many old acquaintances there. Among others Count Lasterie, who has been in Denmark. He now has a large lithographic printing works.

Today, the 13th in the morning, I end my letter and ask you to remember me to all our loved ones, Anders and Mathilde, Mother and Bodil, Karen, Christian, Marie and Sophie, Søren, your sister and her children. I shall soon answer Karen and Theodor!
With love from your
H. C. Ørsted.

I have found a new commissionaire for Brummer in Paris:

G. Dufour et E. d'Ocagne[35], Quai Voltaire N: 13.

He will write to him soon, requesting various Danish journals from him for Baron Ferrussac, whose publisher he is, so that Brummer can have an account with the booksellers regarding the things that Ferrussac is sent. Ferrussac wished to have the work that the anatomist Schumacher has published about molluscs or conches[36] as soon as possible. I suppose it could be sent to Hambourg by the mail coach. Brummer must be the best judge of whether it can be sent on in this way without excessive cost; but the fastest way would be the most advisable if the costs do not rise too much. Brummer should address the work to the bookshop but write "pour Mr. le Baron Daudebard de Ferrussac" on it. Tell this to Professor Zeise, to whom I also send warm regards. Then he will probably be so kind as to tell all this to Brummer and to give him my regards. I expect to send the necessary notes for the rest of my physics book soon.

Paris, February 23rd 1823

Dearest Gitte,
If I had not allowed two post days to pass without writing to you, you would not get a letter from me today, for all kinds of visits and errands oppose it. Yesterday I wanted to spend the entire morning writing, but I had one visit after the other so that I scarcely had time to dress for dinner, which I was to eat with Malthe Bruun. Instead

35. Bookseller and publisher in Paris.
36. *Essai d'un nouveau système des habitations des vers testacés* (1817).

of giving you a journal or obliging myself to one for another post day, I shall content myself with giving you a short report on how I have fared since my last letter. My stay here becomes more interesting for me every day, the acquaintances I have made more sincere and more intimate; thus the scientific benefit that I can reap from them becomes even greater. Chevreul, Biot, Fresnell and Poullet, in particular, are the men I see regularly, but I also see the others very frequently, partly by visiting them, partly at parties. Poullet is not yet famous outside Paris, but he will not fail to win an honourable name for himself. He is introducing me to the young world in Paris. There seems to have been a great change in the way the young world thinks in Paris without this change having become perceptible in writing. A young philosopher Coussin has had an enormous effect on the young Frenchmen with his lectures and given them a taste for philosophical speculation, where one previously rarely saw any trace of it. Comprehensive science, and not merely skills in a single discipline, is now the watchword for them. "If one wants to ride a light beam, one can now be certain of finding something new," said Poullet, "but if one cannot connect it with everything else, what one discovers will be of little worth." He has written a mathematical dissertation on electromagnetism, which is entirely in the spirit that I desire. He shows me great affection, and I feel hopeful that my electro-chemical theory, published so long ago, may be understood by the new scientific generation: however, I must say that I have not found the older generation to be completely unsympathetic towards it; I can especially count on Chevreul. On many occasions I have observed that it is almost impossible to make my theory comprehensible to the French without also presenting them with certain features of *Naturphilosophie*. If I am often tempted to declare myself against *Naturphilosophie* in Germany when I see the misuse of it there, I find myself all the more encouraged to defend it in France; or rather I feel a fundamental difference in the scientific way of thinking, which I would not have imagined to be so large if I had not so often felt its living presence. However, I am far from quarrelling with the French because of this difference. I know better now than before how to appreciate their merits and therefore get on with them all the better. It is good that the nations of Europe have differ-

ences of character like people, this counteracts the one-sidedness that would surely prevail otherwise. – However, I suppose I shall have to interrupt these reflections in order to give some, if little, news. Among the young acquaintances I have made is Du Long, one of the best physicists and chemists in France, Becquerell, a young and rich physicist, who has made excellent experiments on the generation of electricity by pressure, Smithson, an English chemist, Count Laitzer, a French mineralogist from Auvergne, Baron Sternheim, a German mineralogist, Dr. Coreff, familiar with the recent history of Prussia, Prony, famous in applied mathematics, Savart, a mathematician who has performed excellent experiments on sound.

I have been promised but not yet received information regarding the famous eye lotion.

The post is about to leave, I must close. Give my regards to Anders and thank him for his letter, which I received yesterday along with one from you, for which I am no less grateful. These letters are birds which come from home and call to me. I am always homesick when I hear their voices. Love to all the children. Tell Christian that I am well pleased with the sample of his numbers that he has sent me, but now he must strive to write them better so that he can send me a new sample in London when I get there. Karen shall also have praise, but tell her from Father that she must be very diligent. Marie must learn to recognise the letters well for when Father comes home. Sophie can do what she likes. Give my love to Søren and encourage him often from me to strive to regain his old place in school. Love to Mathilde, Mother and Bodil, your sister and her children. Above all, love to you from

Your

H. C. Ørsted.

Paris, March 5th 1823

Dearest Gitte,

Every time I write to you it seems to me that a little eternity has passed since I wrote last. Every day I make new and interesting acquaintances, renew old ones and expand my knowledge. I encounter the greatest courtesy everywhere. People know me wherever I

go, not only among scholars but also among apothecaries, instrument makers, etc. I am often invited out many days in a row, e.g. yesterday Tuesday to Blainville, tomorrow to Ternaux, on Saturday to Say, on Sunday to Thenard, on Wednesday next week to Nicollet, on Thursday next week to Lefevre Gineau. I would have to fear for this assault on my stomach if I had not learned quite well how to look after myself; which is so much easier here as they usually bring all the dishes after the soup as two courses, from which one chooses. Dessert follows at the end. Everyone here eats with moderation, and they do not go to extremes with wine. One first drinks indifferent Burgundy from beer glasses and is well-advised to mix it with water. Claret is served in small glasses like dessert wine. The company is usually lively and cheerful. Most houses have one night each week when they receive visitors. As the main meal here is served between 5 and 7 o'clock, it goes without saying that one eats nothing at these evening parties, but that they are used for conversation and games for those who are so inclined. When one has been introduced to a house, one can therefore visit on such evenings without worrying about disturbing. One leaves when one wants to without ceremony. One can stay there for ¼ hour or for two to three hours, as one thinks fit. Therefore, it is easy to visit several parties in one evening if one wants to. My scientific connections grow in many ways. Humboldt has arrived here recently and has shown me much friendship. I have frequent meetings with Fresnell. Coussin, who has begun to introduce German philosophy here, and who is also a keen politician, has accorded me a most interesting hour. He speaks about events in the various countries with an expert knowledge and a comprehensive view that astonish people. Although he does not stand out in governmental affairs, he is one of the most important liberals and has considerable influence on the youth. Therefore they have taken away his professorship in philosophy but not his esteem and influence. – Among my new acquaintances is also the English chemist Smithson, whom I may have mentioned in my last letter. Recently I spent 3 hours with him to see his way of performing experiments with very small samples. The tools he uses hardly cost anything. Some of them are so small that children would consider them toys, but he uses them with the greatest skill. He often extracts

from small samples constituents which can scarcely be seen, and which many times weigh less than 1/10 gram. The same art is practised by his countryman Wollaston, whom I hope soon to visit in London. I shall, however, stay longer here than I had originally proposed, but I do not intend to return to Paris from London but from Dovre only go to Calais and from there to Antwerp, where I can have Bindesböll meet me. Among the younger scholars I have met, I have already mentioned Pouillet, who gives lectures that meet with great approval. He seems to understand my theoretical ideas. Becquerell, an officer of considerable culture, of whom I have also spoken in an earlier letter, also seems very interested in my chemical theory. He has recently made the important discovery that one can demonstrate an electrical contrast in all crystals, which he immediately recognised as conforming splendidly to my ideas. I have not yet seen these experiments. – At the Institute I have recently demonstrated Seebeck's experiment on the electromagnetic effect generated by heat and my apparatus for the compressibility of water. This apparatus wins great approval, and Pixii is busy making copies for several physicists here. I made my first attempt at speaking French in a large gathering here, and trustworthy friends have told me that I did not do so badly. I feel that I have praised myself and my success a little, or rather too much, in this letter, but I hope that this is all right with you, my Gitte, who I know would like to hear it.

You will also get some news for our political friends. It would have been difficult for me to satisfy them, much as I would like to, if the Chamber of Deputies had not recently made it possible for me to do so. The aristocratic and obscurantist party dares to do more and more. Since they had no speaker to pit against **Manuel**, who, to a high degree, possesses the talent of giving a good extemporaneous speech, and since he has often said very hard things to them, they decided to drive him away at the first opportunity. When, in a recent speech, he said something that could be construed as approval of the execution of Louis XVI, they did not permit him to finish his sentence but began to shout at him. People have not yet agreed whether he said the word which is at the heart of the matter, but which involved no crime even if he had said it. He declares that what he has said was that the National Convention, when threat-

ened by foreign enemies, was stimulated to new energy and new forces, but he is accused of having said "new energy and new forms". That one can dispute this is due to the fact that forces are *forces* in French while forms are *formes*. Neither the journalists' *rapporteurs* nor the members are in agreement on this matter. All liberals heard the former, and all ultras the latter. A commission of ultras had long been ready for such a situation; it had prepared itself and now knew how to snatch up this case. The man who had appeared as the accuser, Count la Bourdonnay, also became the spokesman for the commission. Contrary to the rules of the Chambers, which do not permit harassing a member for what he has said there, contrary to the wishes of the Government, and with disregard of all good manners, the aristocratic party has carried this through; they passed a kind of judgement that he should be expelled from the Chamber for 1 year. They would really have liked to chase him out, but they were afraid that the voters would immediately re-elect him. In spite of this decision, Manuel made his appearance in the Chamber the next day and declared that he would not voluntarily yield his seat, which had been entrusted to him by the people. They called for the National Guard, but the sergeant would not lay hands on a Deputy. Neither would the veterans, so they had to use regular troops, whose leader took him by the collar and led him to his carriage. All Deputies who did not belong to the ultra party followed him to the carriage and then left the Chamber; upon which they deliberated among themselves, with the result that 100 Deputies have sent in a protest against what has happened; however, they could not agree on whether they should stay away from the meetings in the future. Talleyrand is said to have advised them to attend every day but to renew their protest every day. The affair has attracted great attention. The people have followed Manuel every time he left the Chamber during these days and shouted, "Long live Manuel". Lovers of peace and order regret that the party which should most detest revolution is actually starting one, since they trample the law under foot with their violent conduct. People are doubly astonished that they would dare this at a moment when they are arousing the great displeasure of the people by beginning a hated war that stops trade and industry; for it was precisely the prosperity in these areas that

induced the people to accept so much else that they did not really like. It is assumed that the present government must fall, and that the strongest ultras will form the government, and it is expected that a consequence of this will be a reign of terror. It is claimed that a small group of formerly emigrated clerics, who have great influence on the country's most influential lady, were the mainspring. – So now I have entertained you for the first time with politics, but you will not soon hear more of it unless something quite remarkable happens again.

I have not yet been able to find anyone who knows something about the famous eye lotion, but many have made promises. It cannot be very highly regarded since it is so unknown.

As usual, I write until the departure of the post is near. I must end now. Love to Anders and Mathilde, Mother and Bodil, your sister and her children, and regards to all our good friends. Do not forget our own children Karen, Christian, Marie, Sophie and Søren must each have their proper and paternal greeting. Tell them that I long to come home to them. Especially you, my sweetest Gitte, receive my most heartfelt greeting.

Your

H. C. Ørsted.

Paris, March 6th 1823

The letter I write for you alone will be short as usual as the post is about to leave. You may be surprised that I have not yet set the date for my departure from Paris, but I must take everything with me as I do not intend to return. But will this not lead to a miscalculation in the time allotted to the entire journey, you may ask. I do not expect anything significant, but it is impossible to account precisely within one month or 6 weeks. Since I do not intend to make another such journey soon, I must not disregard anything of importance. As much as I strive to use my time well, there is always something left to do.

I shall be pleased to acquire as many beautiful things as I can manage for gifts, but because of the journey it will be best to get most of it in London.

I have brought a red sample, but I do not remember what I am to do with it. Write to me by the next post possible. I am sup-

posed to buy a gold chain for each of the girls. I do not yet know how expensive they will be, but I ask you to consider if you could think of something which could be more useful to them, and which did not cost as much so that I could choose some other thing if the chains turn out to be too expensive. Do not think that I want to pinch pennies, but I would like to be prepared for everything.

Now this is a rather prosaic letter, but these things must be decided. Let me now say at the end what I hope you assume even when I do not say it, that I think of you and the children every day and have the most heartfelt longing for home. I embrace you in my thoughts, my Gitte.

Your own

H. C. Ørsted.

Paris, March 16th 1823

Dearest Gitte,

I hope that this letter will reach you by March 28th in order to tell you that I have thought about this day, and that I shall surely be thinking about it when you read this. If I cannot drink your health in Copenhagen, it shall be drunk in Paris; in whose company you will learn eventually, for to make plans so far in advance strikes me as much too uncertain. I think about home more and more every day and would give a great deal to be able to fly there at least for that day, but as Nature has refused us the necessary equipment for flying, and the art of sailing in the air has not yet made much progress, I shall have to be content with flying to you on the wings of the mind, which are the only ones we have.

You can easily imagine that the number of new acquaintances does not increase so rapidly now as in the beginning, but new ones are constantly added.

On Thursday the 5th I ate with the factory owner Ternaux. There I made the acquaintance of Julien, the publisher of the *revue encyclopédique*, a much-read popular scientific magazine, where they make every effort to publish the most generally important things that occur in the various nations. It is obvious that they must fall far short of such a wide goal, but one finds much more there than might

be expected. I have seen my brother's *Eunomia*[37] reviewed there with well-deserved praise, and other Danish works have been reviewed quite reasonably. When I visited Julien a few days later, he had with him the Persian ambassador, who gave him very detailed information about Persia for his journal. I saw many other remarkable people at Ternaux's, including General Dessolles, with whom I spoke for a few moments. He was not at the dinner party but arrived later. The evening party was extremely large so that the big halls were quite filled with people. One had to push one's way through, as in the stock exchange at noontime. As I only knew a few among those present, of whom few or none were naturalists, I stayed there only briefly. Such crowds are quite common for the party evenings of the large houses.

In order not to detain you with a complete diary, I shall merely mention to you that I have since dined with Say, to whom Prince Christian had given me an introduction, with Thenard, Chevreul, Bre[g]uet famous watchmaker, Le Fèvre Gineau physicist, and today Hachette mathematical physicist.

Every such gathering affords some interest to me, partly by bringing me together with scholars whom I did not know before, and partly by giving me an opportunity for conversations with those whom I rarely get to see otherwise. Among my new, or as good as new, acquaintances is the chemist Clement, whom, however, I had already seen once with Say. He has visited me and seen some of my experiments. He has also entered into a rather long conversation with me about my theory of heat. He is not a bad theorist but really excels as a practician. I have renewed an old acquaintance with the mathematician Poisson and spent an evening with him. He is an ultra but a good mathematician. At Lefèvre Gineau's I met the mathematician Girard, who heads the city's water supply and has promised me all the information I might desire. There I also met the chemist Laugier, who is of no importance. At dinner I sat next to Vauquelin, who manages the assay office and has promised me the information that is pertinent to me for the commission in which I sit. Babinet, a young professor here, is also one of my new

37. A collection of ASØ's treatises in 4 volumes (1815-22).

acquaintances. He does not excel in independent work, but he has read widely and shows me much affection. I have also met Oehlshausen, the young scholar from Holstein. He pleases me greatly, but our acquaintance is quite new. I have recently returned home from Hachette, where I have renewed an old acquaintance with Bosc, a respectable naturalist, and become acquainted with Hussard, a veterinarian, with Moinau [Moigno], a very interesting and enlightened man, who, among other things, had a very clear understanding of **Kant's** philosophy, and with Le Jeune, a young mathematician from the region of the Rhine. This morning I also made the acquaintance of Brochant, one of France's very best mineralogists, and with Beudant, excellent in both mineralogy and physics. I become ever better acquainted with Arago, and he shows me much friendship. Fresnell, who has made such magnificent discoveries about light, I see regularly.

Now this is briefly the last 10 days of my life. I would have liked to tell you some of their contents, particularly the many interesting conversations, but I would never be able to finish my letters if I were to go into so much detail. I must save something until I see you; then my experiences and observations will come out little by little, and I shall be able to tell them to you with more liveliness than when they must first pass through my pen.

Be well, dearest Gitte, and receive my most heartfelt congratulations for your next year and the many to come. Give my love to all the children, Karen, Christian, Marie, Sophie, Søren. Love to Anders and Mathilde, Mother and Bodil, your sister and her children, etc. Regards to Forchhammer and Zeise as well. Be embraced a thousand times in the thoughts of

Your

H. C. Ørsted.

Paris, March 23rd 1823

Dearest Gitte,

Yesterday and today I had decided to write you a long letter and to send you a couple of others, but I have had so many visits that it has been impossible for me to set pen to paper in the hours I could appoint for it. This morning at 8 o'clock I had a visit from De-

saugier, who stayed until 10 o'clock. He had not been gone for ¼ hour before I had another visit from the talented young orientalist Oehlshausen from Holstein. The letters must be sent by 12 o'clock. I shall have to be content with writing what can be put on paper in a quarter of an hour, for the post-office is far away. – I have not been able to tear myself away from Paris yet but have finally determined that my departure will be on or about April 15th. The most important thing by far is that I arrange my financial situation accordingly. I must therefore ask you to request Councillor of State Collin or Boye, who should both be given my warmest regards, to send another draft to me here for 1000 francs, the sooner the better. Also to send to Professor Frauenhofer in München a bill of exchange for 334 guilders, for which I have received instruments, and finally to send me a letter of credit in London for the remainder of the sum that I have for my journey. I can readily see that you will start imagining that my journey will stretch out longer than I had expected; but I am still of the opinion which I expressed to you in an earlier letter that the extension will not exceed 6 weeks, or to be more precise, I hope to come home in July instead of May. Therefore I am pleased to accept Doctor Forchhammer's offer to lecture for me at the beginning of the summer, as I shall otherwise have to lecture twice daily after the holidays, which would be burdensome both for me and for the listeners. I am otherwise well and have my hands full every day with physics and have made some interesting new experiments together with Fourier, one of the secretaries of the Institute. More about this when I can write a longer letter. The most loving regards to all our loved ones: Anders and Mathilde, Mother and Bodil, your sister and her children. Kiss Karen, Christian, Marie, Sophie from me. Love to Søren. But especially to you from

Your

H. C. Ørsted.

Paris, April 4th 1823

Dearest Gitte,

You will receive a short letter from me again today so that I am almost afraid that you will start to take me for a negligent letter writ-

er, but I have an excuse which may even pass for a good defence. As I wrote to you some post days ago, I have made a rather interesting discovery, namely a galvanic apparatus which consists only of solid materials without the mediation of any liquid. Since you have heard and seen so much related to galvanism, you can probably stand hearing another few words about these experiments. With the aid of my electromagnetic discoveries, Seebeck in Berlin had come to the most beautiful of the discoveries that has yet sprung from mine, namely that if one assembles a ring from two curved pieces made of different metals and heats one of the two joints, the entire ring has the same effect on the compass needle as a galvanic circuit. The two metals which give the best effect in these experiments are bismuth and antimony. A piece consisting of these two metals soldered together has the same effect as zinc and copper in a galvanic circuit. Heat has the effect of the liquid, if I dare put it that way. It was therefore a natural thought that one could solder together many pieces of antimony, bismuth, antimony, bismuth continually alternating into a ring which gave a galvano-magnetic effect when every other joint was heated; and thereby one would obtain for Seebeck's circuit the same effect as the voltaic column for the galvanic. It seems that Seebeck has had a different theory about this. Suffice it to say that I have performed experiments on this and found it to be true. I believe that this discovery will have far-reaching consequences. The laws for this new effect are probably fundamentally the same as for the galvanic circuit, but they look so different that I had to use a large part of my time during the last 2 weeks to discover and determine them. This work[38] would have cost me even more time had not Bindesböll, with an untiring patience and love of the cause, assisted me with the great many tasks and experiments which the investigation entailed. I more or less finished only yesterday. This will certainly extend my stay in Paris a little, but not more than that I have given notice at my lodgings, where my month ends on the 26th, and I even hope to give my landlord a few days. I now hasten to make use of every opportunity

38. *Sur quelques nouvelles expériences thermo-électrique faites par M. Le Baron Fourier et M. Oersted* (1823), KM II, pp. 272-82 and JJK, pp. 470-77.

to benefit from Paris and will then strive to make use of England as quickly and as well as I can. – You ask me how I can tolerate the quiet and inevitable monotony of life at home after such a marvellously varied time and so many remarkable acquaintances? I answer that I shall tolerate it very well because I long for it. The good Danish land of my birth, my old true friends, my Danish listeners would already draw me home; what must they not accomplish together with my beloved wife and my very dear children, who alone are capable of drawing me anywhere? How much would I not miss my brother if I did not know that the separation from him would only amount to a few months? In short, I shall not only enjoy home as before but with increased satisfaction after a long absence.

Regards to all good friends from me, particularly to Anders and Mathilde, your sister and her children, Mother and Bodil. Love to the children, Karen, Christian, Marie, Sophie, Søren. And you, my Gitte, be embraced by

Your

H. C. Ørsted.

Apr. 4th 1823

Today I am prevented from writing a proper letter for you alone. Please be content with the other letter and be convinced that you and the children are always present in my thoughts. I celebrated your birthday here by drinking your health with Bindesböll. I thought a great deal about home, but as you can imagine, since you know me, more with a fiery eagerness to be there than with complaints about not being there. However, I can tell you that I have now and then been plagued by uneasy moments on this journey when fears of possible misfortunes which could strike my dear ones have arisen in me. That is why your letters are always happy messages for me. Every time I receive a letter from you, it is as if someone had given me a wonderful gift. I press a kiss to the letter. Be well, my Gitte.

Your

H. C. Ørsted.

Paris, April 13th 1823

Dearest Gitte,

I expect to send you my last letter from Paris soon. I hasten to complete all the business that must be done. I have certainly stayed here longer than I had intended. The primary cause of this is the discovery about which I have already written to you. If I had known that its elaboration would take me more than 3 weeks, I would probably have reconsidered before beginning the experiments; and yet, on the other hand, they seem to be sufficiently remarkable to be worth the sacrifice. If I know you, you would have encouraged me yourself to do them even if you had known that I would stay away longer. I cannot yet say what day I shall leave Paris, but it will be before the 26th as I have given up my lodgings on that date. The route to London is only a matter of two or three days. In London and in every other place I visit in England, I shall strive to avoid anything that could be called a waste of time even if it might otherwise be justifiable, as here in Paris. Even if some peculiarity of nature should invite me to an investigation, I shall put it off until you can help me. Therefore I believe that the 3 months I have decided to stay in England will suffice, and even more so as the obligingness of the English is said to be far quicker in carrying out its intentions than that of the French. The journey home will not take long. I estimate two weeks for the return journey. From this you will see that, if I can shorten my stay in England, even if it were only by 10 or 12 days, I can be home in the first half of August and, God willing, celebrate my birthday at home. I understand that an estimate so far in advance is unreliable, but I shall still spare no attention in trying to achieve the desired goal. – It would be too lengthy if I wanted to tell you all my experiences here, which is to say if I take experiences to mean new acquaintances, interesting scientific gatherings etc. I shall only mention one or two things. I often go to dinner with the famous watchmaker **Breguet** and meet many interesting men there. The mathematician Prony is a daily guest there. I have had the opportunity to meet Le Mercier, one of France's greatest living poets, and General Marescot, one of France's best generals from the time of the Revolution. I recently attended a dinner which the publisher and the associates of the *Revue encyclopèdique* hold together on the first

of every month. I sat between the famous anatomist Geoffroy de St. Hilaire and Ampère and next to the latter was an English mineralogist Underwood. When people complained that the vacation lasts all summer at the University of Edinbourg, the Englishman said that people needed much time to work on their own if they were not to be mere parrots, and that he would venture to say that the English universities educated just as many competent men as universities in the despotic states. I do not want to defend the man's assertion but merely note it for its curiosity. After dinner Jullien, who is the publisher of *Revue encyclopèdique*, took me to a party at Langlès', the librarian for manuscripts at the big library. There I saw Doctor Gall, whom I shall see again in England. Langlès is, among other things, remarkable as a lover of beautiful bookbinding. He and a small party have united in a society for the promotion of the art of bookbinding. They have books bound so expensively that a single volume comes to several hundred francs. One franc corresponds to half a rix-dollar. Some time ago, a man who did not understand the finer art of binding books had four folio volumes bound by the best bookbinder here. When they were finished, the bookbinder demanded 500 francs for each. The man was shocked and would not pay, but finally they agreed to choose Langlès and Vanpradt, two librarians, as arbiters. They declared that the bookbinder should be satisfied with 450 francs for each volume so that the man got away with 1800 francs or 900 Rbd for his four volumes. They promised to show me some of these costly volumes. – I have often dined with the Danish General Consul Hoppe and found several countrymen there, among others Captain Falsen and Captain Seidelin, also one Oertel, who is now the Mecklenborg chargé d'affaires, but whom I knew 20 years ago in Halle. But the reason why I mention this acquaintance is really to say that Hoppe has shown me the works for an extensive gas illumination in Paris. Several places have already been illuminated with gas here. The government has built a works which it has handed over to a company along with certain privileges. A company, of which Hoppe is one of the principals, already illuminates the Odeon Theatre and several houses in Faubourg St. Germain, among others a restaurant in the house where I live. Their gas is excellent. The big works, which will soon be finished, is really

excellent. The shares in it run to more than one million francs or over 500,000 Rbd. At Hoppe's I became acquainted with the director of the works, named Povels, a young man of 27 who seems to possess considerable practical skill.

Among the beautiful things that I have seen recently, the so-called Diorama, a device which is similar to the Panorama, deserves to be mentioned. It is one of the most curious spectacles. One climbs up into a kind of tower, where the passage is quite dark so that the eye grows unaccustomed to daylight on the way. One finally comes to a round hall where there is a view as through a large open window. When I came in, we saw before us the interior of the church in Canterbury as beautiful and natural as can be imagined; but after we had contemplated this for some time, the entire hall turned round, and we now saw the harbour at Brest. I have never seen anything more strikingly imitate reality. The sky was imitated so naturally that I really needed time and deliberation to convince myself that it was not the real blue sky with lightly scattered clouds that I saw. I thought of you and wished that I could show you this interesting sight. Finally, the impression of this spectacle began to be less pleasant due to the immense silence and absence of motion there; but otherwise it did not cease to be striking. As I said, I would like to have had you there and the children, too. – However, that is not to be. Love to them from me. Thank Anders for his letter; he shall have an answer before I leave Paris. Love to Mathilde, Mother and Bodil, your sister and her children and regards to all good friends. Especially love to you from

Your

H. C. Ørsted.

Apr. 14th 1823

Among so many letters I scarcely have time to write more intimately to you, dearest Gitte. My long letter tells you the most important things. I hope that my letter about your sister's case will have your approval, but I can hardly trust that I have hit the truth in such a delicate matter. However, I hope that there will be no misunderstanding in that respect; I **will in no way advise against** your sister accepting Klingberg's offer as it is. On the other hand, I cannot

with confidence **strongly advise it** since I cannot see through all the conditions. I would not be unhappy if Kl. were to read my letter although I do not see see how that could be arranged, or rather if it could be arranged. Women are much better able to judge that sort of thing than men. It may be best not to attempt to have any influence on this; but what I have said in the letter in question is, as you can easily imagine, my true perception of the case, which anyone may know as far as I am concerned. I can see that recently my most personal letters to you have become genuine business letters, but this is what happens when too many matters arise that have to be decided. You will find responses to many confidential remarks in the attached letters. One of them has a wafer affixed but is still open; I ask you not to deliver it until the wafer has dried. I hope that the man who receives it will feel that I am speaking the language of truth and fairness and will no longer demand to be the only one to whom I show friendship and confidence. That you see this letter is proof that I regard you as my other self. **Absolutely no-one else** should know its contents. Once again, farewell for today, my Gitte.

Your

H. C. Ørsted

Paris, Apr. 23rd 1823

Even though time is short, I must write two words for you alone. However, I must also write about business here. I find that gold chains for the children will not be as expensive as I had feared. One *alen* costs 12 Rbd in our currency. Tell me in the next post how many *alen*.

I have a sample of red cloth with me, and I do not know what to do with it. Write to me in the next post and tell me what I am to do about it!

As soon as I receive your next letter, I shall leave Paris and look forward to making the next part of my journey, which will bring me close to home in time at least.

The post must go. The letter cannot be longer. I embrace you.

Your

H. C. Ørsted

[Paris, 1823]

Sweetest Gitte,
The longer I stay in one place the shorter my letters become. At the end I am as much visited and pestered in Paris as in Copenhagen. My last letters have unfortunately been very hastily written. Most often I must write them early in the morning and still with many interruptions. You must forgive me that the last two personal letters have been so brusque and perhaps even a little odd. I recall, for example, that I wrote that I let you read my letter to Z. as a special confidence without further explanation; my meaning with this was only that such answers to confidential letters, even though their contents are ever so innocent or perhaps even satisfactory, are still only for those to whom they have been written, and for a man's alter ego if absolutely necessary. – I have had many letters and introductions here from Prince Christian and even imagine that I have told you so. In the coming days he will receive a long letter from me in which I shall give him information about Haüy's mineral collection, which he wants to buy, but for which they are demanding 10 times as much as it is worth, 150,000 Rbd instead of 15,000. I am truly sorry that I must neglect writing to Karen and Theodor again today, but they shall certainly hear from me in the next letter.
Your
H. C. Ørsted

I have determined that my stay in London will only be 4 weeks so that I shall later have some latitude and not be away longer than until the middle of August. I am really beginning to miss home with a certain sadness even in the midst of all the interesting things in Paris.

Paris, April 25th 1823

Dearest Gitte,
You now finally receive my last letter from Paris. My passport is in for signature, and all the preparations for the journey are under way. Yesterday I acquired a travelling companion, a manufacturer by the name of Say, a brother of the famous writer on national economy, whose main work has also been translated into Danish. This

suits me all the more since, as a consequence of the plan already made in Copenhagen and from economic considerations, I must leave Bindesböll in Paris and later have him meet me in Antwerp on the return journey. Since I have just as much trouble in leaving Paris as I had earlier in leaving Copenhagen, you must excuse the brevity of the letter you receive today. I shall only tell you about a few of my most remarkable experiences or gatherings. Ampère, who has done so much work on my discovery, and who has advanced a most ingenious theory about it, was greatly displeased that I still maintain mine, which is extremely simple. In order to have a conversation with me about it in the company of several scholars, he invited me to a dinner party where also Fourier, du Long, Chevreul, Frederick Cuvier, Savary and Montferrand were present. The last two are young adherents of Ampère. The conversation began after the meal and lasted almost three hours. I was entirely successful in proving that my theory can explain all the phenomena; and what was strangest, I had to prove to Fourier that my theory was older than Ampère's, which incidentally was easy as I had already given it in my first publication. Even Ampère's two disciples declared that my theory was capable of explaining all the phenomena. They claim that Ampère's can as well; and as his theory is nothing but the converse of mine in that he has moved the circuits that I discovered from the conductor to the magnet, it is probably difficult to find a definitive objection to his theory, but I do not really demand this. The question whether these circuits are in the magnet or the conductor is one which I am happy to leave to closer investigations. At the moment a Dr. Gloesener is occupied with a detailed exposition of my theory, which may be beneficial for those who cannot grasp a theory unless it is described in such detail that there is little for them to think about. – Yesterday I attended a public meeting of all four French academies, of which the one we call the Institute is the first class or the first academy. There Fourier gave a review of the progress in the mathematical sciences in recent years, on which occasion he also spoke of my work with all of the praise that I could wish. Quatremère de Quincy, Secretary for the Academy of the Fine Arts, spoke about Canova, in many regards beautifully; but he forgot to talk about the influence which Winckelmann's works must have had in

preparing for the new artistic era that began with Canova, whereas he talked about the influence that his own advice had had on the artist. Raoul Roquette, Secretary for the Academy of Philology and History, read an extremely one-sided treatise on the Egyptians' one-sidedness in the arts. Raynouard, Secretary for the Academy of the Belles Lettres read a very beautiful poem about Fenelon's stay at Court as the tutor of the Prince. Many ladies attended the meeting, and everything that was found to be beautiful was applauded according to the custom here. It seems to me beautiful and useful for propagating a taste for the sciences that the learned societies thus give the public an idea about their activities once a year.

After many fruitless efforts, I have obtained some information about the eye lotion which Mrs. Oppenheim so much desired. It was only by writing to Strassbourg that I could find out something about it. It was only a quack trick to keep the remedy secret. It consists of burnt lime and ammonia and has long been known under the name of English smelling salts. When it is freshly prepared and held before the eyes, it is really quite refreshing and can probably help with certain eye deficiencies. I ask you to tell Mrs. Oppenheim and Miss Zuschlag that I am very sorry that I cannot give them more advantageous information about this remedy, but I shall by no means discourage them from trying it, which is all the easier as they have it nearby and moreover at a twentieth of the price which the oculist demanded.

I owe Oehlenschläger another letter. Tell him that he will get it from England.

I must now say farewell for today. Regards to all good friends and in particular to Anders and Mathilde, your sister and her children, Mother and Bodil. Love to our own Karen, Christian, Marie, Sophie, and do not forget Søren. To you, my dearest Gitte, I say farewell from France in order soon to greet you from England.
Your
H. C. Ørsted.

To Prince Christian:[39]

London, May 5th 1823

Your Highness,

Receive my most cordial and sincere thanks for the new proofs of your grace which you have been pleased to give me during my journey. Although I already had the good fortune to be connected with many of the foreign scholars to whom Your Highness had been pleased to give me letters, it was clear to me that the high favour with which a so respected and admired Prince spoke of me gave them a new friendship for me and a new desire to be of service to me. Count Bournon, Cuvier, Say and Arago have given me all the demonstrations of genuine goodwill that I could desire, and particularly the first and last of these have shown a special eagerness to help me with regard to the object of my journey. Brognard has no less shown me friendship and confidence. Here in London, where I have only been for a few days, Davy has received me with a courtesy for which he is not otherwise famous. He has already today shown me the laboratory at the *Royal Institution* and some of his own and Faraday's experiments. All these famous men have asked me to recall them to Your Highness' memory.

I have regarded it as my obligation to inform myself as precisely as possible about Haüy's collection and the plans for its sale. I have taken pains to obtain the opinions of various scholars privately and informally and have paid particular attention to the opinions of the men who have been particularly involved in the purchase and sale of minerals. The government has appointed a commission to make a suggestion about this transaction. The commission has estimated a price of 50,000 francs, which is only 1/6 of what the family demanded. Haüy's heirs are therefore accusing the commission of partisanship and malice. The commission has responded that it was only for the sake of the founder and with regard to the historical value of the collection that they suggested such a high price. Several of the members, as well as other mineralogists, have told me

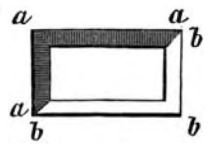
39. It has been impossible to find the original of this letter, which has therefore been taken from MØ II, pp. 68-72.

that the value of the collection, calculated from the price of the individual pieces in the mineral trade can be estimated as only 20,000 francs, and even this was somewhat high. Mme Viellemot has told me that Haüy had advised them to keep it if there is no offer that they find acceptable. I have told her that every such collection loses value with time, mainly due to the many new discoveries; however, I believe that she and the rest of the family will maintain their demand although I believe that they should sell the collection for 20,000 francs or perhaps even less; but the notion that the family has of the enormous value of the collection will probably mean that they will not sell it while there is still time, so that it may well be that they must finally settle for a much lower price. Systems continuously supersede one another, and every time a new one prevails, the old mineral collections are rearranged, especially when the number of newly discovered minerals has grown considerably. The value which a collection such as Haüy's cannot lose is the historical one, to give us a true picture of the state of the science during the life and career of a great master. Among the systems which are now being tried, one by Beudant[40] will soon appear. He wants to arrange all minerals that are composed of acid and alkali in classes according to their acids because he finds a greater similarity between those compounds with a common acid than between those that have a common alkali. Thus, all carbon salts (*Carbonates*) will be in one class, and it is certainly easy to identify them by their effervescence with acids. All sulphur salts (*Sulphates*) will form another class, which can be identified immediately with a blow-tube by forming a sulphite (*Sulphure*) when fused in contact with carbon in the blue part of the flame. The sulphites can be recognized by the fact that, when moistened and placed on a piece of sheet silver, they make a black spot on it. In the same way, it is easy to find simple characteristics for each of these classes, just as it is possible to arrange those minerals that do not contain actual acids or alkalis in the same system because one always establishes the classes according to the electronegative component. I would not dare to offer any judgement regarding the sufficiency of this system. We know the flaws of the old

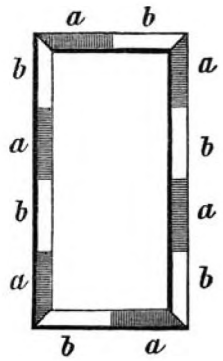
40. *Traité élémentaire de mineralogie* (1830-32).

systems after long scrutiny, the new are like promising young people from whom we may expect much, but who might disappoint our hopes. However, since the system is interesting and comes from an excellent man, I thought that it would not be uninteresting for Your Highness to hear a few words about it.

Seebeck's electromagnetic experiments have occupied me much in Paris. I have performed experiments on them in the company of Fourier, the Secretary for the mathematical division of the Institute. Seebeck had found that one could induce an electric effect, discoverable only with a compass needle, by means of two metals which are combined to form a ring or other circuit when one of the joints is heated.



If *aaa* is e.g. antimony and *bbb* bismuth, and one of the joints is heated, the entire circuit acts as a galvanic circuit. It would appear that Seebeck has not wanted to make a construction similar to the voltaic pile; this, on the other hand, is what I have done in the company of Fourier. All the parts designated *a* in the figure represent antimony, those *b* bismuth. Every other joint is heated or cooled, or one can combine the two effects so that of the 12 joints shown here, 6 are heated and the other 6 covered with ice.



The laws that govern the effect of this tool are far too complicated to be described in a letter; therefore, I shall merely observe that this effect has greater difficulty in penetrating the elements than is the case for the galvanic circuit so that it may well be possible that one cannot obtain chemical effects from it until one goes up to a number of several hundred, even thousand, elements. I am pleased, however, that I have been able to lay the foundation for the introduction of this remarkable tool in physics; I hope for great results from it.

I cannot yet give Your Highness any noteworthy news from England; but when I have been here somewhat longer, I hope to be able to report something of interest. They have made so much progress here in compressing gases that they have been able to produce carbonic acid gas, chlorine and 6 other gases in liquid form, but I have not yet had time to enquire how. I must therefore postpone speaking more about this until I have the honour of writing to Your Highness again soon.

May Your Highness graciously permit me herewith to assure you of my deep veneration and boundless devotion.
Your most obedient servant
H. C. Ørsted.
To
His Highness
Prince Christian Frederik
of Denmark.

To Inger Birgitte Ørsted:

London, May 5th 1822[41]

Finally, dearest Gitte, I am in London and rejoice at the thought that this is, so to speak, the beginning of my return journey. I left Paris on the morning of April 29th with my fellow-traveller Say, the owner of a large sugar factory in France and an author on national economy like his famous brother, from whom he differs in several

41. Added in the margin in what resembles MØ's handwriting: Regarding the date of this letter, there is an evident error; it should be 1823 instead of 1822. Ø. made no journey to England in 1822. Signed HCØ July '47.

opinions without thereby being less affectionately attached to him. We travelled through the night and arrived at 5 o'clock in the morning at Abbeville, where Say has his mother-in-law. We rested a few hours there. Then Say ran around, and I wrote letters which I had been unable to finish in Paris. Among others, I had two letters of recommendation to write, one for a Dutchman and another for someone from Darmstadt, in order to recommend them in their countries, to the extent that I knew their studies and work. In the evening, we continued our journey and arrived the next morning at Calais, where we had a quick meal and immediately boarded the steam-packet to Dovre. A steam-boat could not have more beautiful weather than what fell to our lot. I even found good company on the steam-ship; namely an entire French family that I knew: Humblot-Conté, the chemist Thenard's father-in-law, Madame Thenard, a Mr. Lorent[42] with his wife, who is also Humblot's daughter. No-one was sea-sick on the ship, and the voyage lasted only 3 hours. We had dinner at 6 o'clock at Dovre, and I, along with Say, visited the fortress at Dovre. This fortress stands at such a considerable height, is so well fortified by nature and art, and has such large reserves that it will not easily be taken. Even though Dovre is far from numbering among England's large towns, it is illuminated by gas. The cleanliness of the inn and the precision and order of the service made a striking contrast to what one sees in France. It is rare to see a house in poor repair in England. I made this observation not only at Dovre but all the way to London, as in London itself. We spent the night at Dovre and departed at 7 o'clock in the morning with a public coach to London. This coach or diligence is big and comfortable, with room for 6 people. Humblot with his two daughters and one son-in-law, Say, and I had seats there. Sometimes one of the passengers in the coach chose to sit on the outside, as they say, on high seats at the front and back of the body of the coach, even on the top of the coach itself. One enjoys a beautiful view from there. Sometimes a very polite Englishman, Smith, who had only taken a seat on the outside, changed places with one of the men and exercised us with much energy in speaking English. The road is really like a

42. Later also spelled "Laurent".

floor, the toll-farmers have to maintain the roads from the proceeds and are penalized when caught in neglect. One sits together in a quiet conversation as in a drawing-room. I amused myself simultaneously with the conversation and with the view. England is so built up from Dovre to London that one almost seems to be travelling through one enormous city. One gets this impression all the more easily as the speed of the coach conveys us past the scattered buildings in a very short time. I had extensive conversations with Humblot about French literature and about physical and chemical theories, in which Madame Lorent participated with much intelligence. Her sister is more beautiful and quite sensible but not as thoughtful. The conversations were varied and stimulating. At 5 o'clock we came to London and got so far that we were able to be lodged, Say and I, in Hotel Jaunay, Leicester Square before 7 o'clock, so that we were still able to eat dinner after London fashion. After our meal we went out without a guide to see something of the city. The illumination by gas completely fulfils its purpose here, and we had ample opportunity to see the beautiful boutiques. We followed a very long street, called The Strand, which is extremely long and also very broad. The beautiful pavements, paved with nothing but broad flag-stones, makes walking easy here, and one does not risk being run over as in Paris. Almost all the streets of London are broad and clean. At this time, when the weather is dry and it is dusty, appropriately equipped wagons drive around to sprinkle the streets. It is easy to feel at home in London, and I have been given directions politely wherever I have asked. When one is very far from the places one asks about, people usually say how many miles (NB English) it is. The length of London from east to west is 7 ½ English or 1 ½ Danish miles, the breadth from north to south about 1 Danish mile. According to specifications there are 8000 streets, alleys, squares, etc. in London. Coaches go continually through certain long stretches of the city so that one can take a seat in them and ride one English mile for 1 English shilling (about 3 marks in silver). One can ride on the outside for ¾ shilling. I have met Clausewitz, who has been most courteous toward me, as has the Danish Consul Campell. I send regards to Forchhammer from them both. I have also visited Davy and brought him a letter from Prince Christian. He has re-

ceived me so well that, far from complaining about him, as most people do, I must, on the contrary, be very satisfied with him. Today I have been with him in the Royal Institution, where he and Farraday have shown me their latest experiments.

May 6th. I must end in order to get my letters sent off. I can only add that I had another long walk yesterday in the innermost part of London, called the City, and found there crowds just as large, but not so difficult, as in the large streets of Paris.

Love to my brother and Mathilde, Mother and Bodil, your sister and her children. Give my love to our own children Karen, Christian, Marie, Sophie, Søren and tell them that their father is thinking very much about coming home to them soon. Regards to all our other friends; most of all, love to my Gitte from

Your

H. C. Ørsted

London, May 6th 1823

Things are as usual with me, sweetest Gitte. I can hardly finish my letters before the departure of the post. But when you consider that I have written a long letter to you, two small ones to Karen and Theodor, and even sent a long letter to Prince Christian, you will see that this constitutes a rather extensive post-day's work. Anders will get a letter next post day, but then you will not although you will not have long to wait. The first letter could perhaps best be addressed to the foreign legation and sent to the foreign department. Do not send such thick letters, I mean on such thick paper, as has sometimes happened with my friend Forchhammer. – Watches, gold chains, which were to be bought in Paris have been purchased but will not arrive before me. Winkler's commission can be executed when he wishes, but the thermometer is no good. I shall write a note to him one of the next post days about this, perhaps even in English, in order to avoid offending his sensitivity if he received from your hand a letter that he might think you had read; for regarding Chevalier's thermometer, it is a simple newspaper humbug.

I see that my confidential letter to you has once again turned into a kind of business letter, although about things that only you should know. I shall close now and tell you that I think about you

more often than you probably imagine, and that the light-hearted disposition that you know in me does not prevent me from often falling into a sad mood from missing you for so long. I am never at home unless at home with Gitte.

I hope that you will not long have cause to complain about my slowness in travelling or leaving places.
Your
H. C. Oersted

NB. I accidentally wrote my name here as I have to write it in Paris and London so that people can pronounce it.

To Anders Sandøe Ørsted:

London, May 11th 1823

Best Friend and Brother,
Although you often see and hear from me through my letters to Gitte, I must write to you once again to let you hear how I am doing in the great city of London. I am beginning to feel quite at home here and to get accustomed to the language, which is undeniably difficult due to the extreme lack of rules for pronunciation. However, I have found the English, by which I mean the scholars and the educated, to be tolerant and most willing to help me. You have learned from my previous letter to Gitte that I have become acquainted with Davy and been well received by him. I have since made the acquaintance of Wollaston, who is regarded as one of England's brightest men, an excellent physicist and chemist. He is, among other things, a great master in performing chemical experiments with small samples, and he has shown me experiments of this sort that are very interesting. One grain apothecaries' weight is a very large quantity in his experiments. He is capable of extracting from a much smaller one the constituents of a substance which may contain 4 or 5 elements. This method of investigation is both inexpensive and fast and can, on many occasions, replace much more extensive work. Another of England's most distinguished scholars is Thomas Young, doctor, mathematician, physicist, and philologist. As a physicist he has distinguished himself with the discovery

that rays of light are able to affect each other and at some points to cancel and at others amplify each other's effect, a discovery with important applications in natural science. As a philologist, he has discovered how the Egyptian hieroglyphs are to be read, at least he has laid the first grounds for this. He has had the fortunate idea that *nomina propria* in the hieroglyphic inscriptions must necessarily be expressed with something that corresponds to letters. Certain animals with very simple names were used instead of letters or syllables. In this way he was able to read e.g. the names **Ptolemy** and Berenice[43] in the inscription on a monument at Rosette. Afterwards, Champollion the Younger in Paris has pursued the same idea further and brought it to the point where one can read almost all names designated by hieroglyphs on the Egyptian monuments. In this way, for example, they have been able to read the word autocrat on the famous zodiac from Dendera, from which one sees that it was created at the time of the Roman emperors and most likely under Claudius or Nero, who on their Egyptian coins are designated by this word alone. This zodiac thereby becomes two thousand years younger than many have wanted to make it. I hope that the continued study of this subject will bring us even more information about Egypt. –Herschel the Younger is another remarkable man. His father died a few years ago. Herschel the Younger is England's leading mathematician, an excellent chemist, and a good physicist. A son seldom bears the name of a famous father with such distinction.

It is strange that people in England so strictly observe formalities even though they love freedom so much. For the sake of freedom they have undoubtedly adhered to formality in all public proceedings and from there transferred it to other things. One also sees this formality in their Royal Society. Davy had invited me to dinner there, after which I was in the Society's learned assembly as a member. The Society meets for dinner at the famous tavern the *Crown and Anchor*. The President also presided here and proposed the toasts, but he left the party before the rest of us in order to go to Somerset House, where the learned assembly was held, because he could not

43. Ptolemy I (ca. 367 BC to ca. 282 BC), Egyptian king of Greek origin and his queen Berenice (ca. 340 BC to ca. 277 BC).

preside without being in gala. He now sat on the elevated presidential chair with his hat on his head, but every time he spoke to the Society, he took his hat off. As it was the first time that I was there, a kind of initiation ceremony was performed. I had to inscribe my name in a large book and then approach the presidential chair, whereupon the President (Davy) stood up and held a short and very honourable address to me, and throughout the address he held my hand, which he had taken when I approached. The members do not read the treatises themselves, but these are read by the Secretary. The meeting was very short. They were content to hear part of a treatise by Buckland on the caves in which the remains of animal bones are found. Why it was not read in full, I still do not understand.

Among the most remarkable things I have seen here so far are Parkins' inventions. He showed me the instrument with which he compresses water, and with which he can create an effect 2000 times stronger than the pressure of the atmosphere. His siderography is even more remarkable. He engraves a piece of steel which, by tricks of his own, he can make very soft, then hardens it and impresses it on a soft steel cylinder. This is hardened again and impressed in new steel which, when it is hardened, acts as a copper plate. He makes plates for the bills of several banks. He then has 8 vignettes engraved by 8 different artists and unites them on one plate. He can now deliver repeated steel impressions of the same plate, almost as many as one wants; and since one steel plate can hold for many hundred thousand impressions, it is easy to see that one will never experience the small irregularities in the bills which are produced by re-engraving or by renewing the plates. Show this or tell it to Collin; perhaps we could benefit from this in our country. I shall go there more often and collect further information about prices etc. If Collin should have further questions in this matter, I shall try to answer them with the greatest diligence. The same Parkins has also made new improvements of the steam-engine so that one can obtain the same effects with a smaller engine than usual, using 1/10 of the fuel. They will make use of this engine in steam-ships as soon as possible. As the new steam-engine will use only a very small quantity of coal, Parkins believes that it will be possible to use his new steam-ship for trips to China. Parkins is the most open man there

can be; he gives such detailed information about his inventions that it is clear that he does not fear that anyone will steal his greatest secret, his great spirit of invention.

I would not finish my letter if I were to tell you all the remarkable things that I have already seen in this remarkable city; however, you shall soon hear from me, if not directly, then at least through Gitte.

I see from your so cherished letter, which I received in Paris, that Schäffer still continues to call witnesses about the Bornholm pit-coal. I have no doubt that our lawyer will compare what is in the description of Bornholm's geology with what Schäffer says is in it. In the description we have explicitly stated that the Bornholm coal found so far is not of the best quality, but that it can be used for many purposes as it is, and that one could hope to find better pit-coal there. Schäffer ought to stop trying to disprove this even if he could obtain testimony that someone was not satisfied with the Bornholm coal, which will happen to those who do not have suitable furnaces, or who want to use the coal for everything that the best English pit-coal can be used for. However, I am sure that Guldberg will not fail to mention this.

I must close now. My kindest regards to Mathilde. Regards to Collin, Winkler, Rosenvinge, Sibbern and all good friends. I must also ask you to give my love to Gitte and the children, for she will not receive a letter today; on the other hand, she will get one with the next post. I am pleased to think that the time for my journey home comes ever nearer with quickening pace. I long unspeakably to be at home with you and to renew our old life.

Your

H. C. Ørsted.

To Inger Birgitte Ørsted:

London, May 15th 1823

Dearest Gitte,

From my last letter to my brother you will know what I have seen and learned in the week following my first London letter to you. I have so many things to write about here and so little time that I can hardly settle on a tolerable selection. I have already told you about

London's vast size, but it is not always an advantage to drive, partly because carriages are so expensive, partly because one does not advance much faster with them. Therefore people prefer to walk a long way on the beautiful flagged pavements and to use the many passages that can often shorten the way considerably. However, once in a while one does make a journey by coach. When the distance from one place in the city to another is 2 or 3 miles[44], one takes a so-called stagecoach (read *Stædjekotsch*), a kind of elegant carriage, and pays a pittance for it. But this conveyance goes only along certain routes. Other long distances can be covered on the Thames, where there are always boats at certain points and people to row them. But with all this I can still assure you that a day rarely goes by without my walking a couple of Danish miles so that I am extremely tired every night. Otherwise, I feel well with all of this vigorous movement and imagine that, with its help, the chimney smoke of London should be as healthy as a visit to the best watering place.

I find great courtesy everywhere, and the courtesy of the English is very practical: They frequently sacrifice considerable time to assist me, which is so much more worthy of thanks because they know full well what time is worth. I was recently with Herschel, the famous father's famous son. I was invited there to lunch (which here always consists of tea, a little cold meat and bread, and usually boiled eggs). Almost everyone there offered and has since done favours for me. A Mr. South invited me to a similar lunch and, on that occasion, showed me his small but excellent astronomical observatory. Afterwards he walked a long way with me out of town and took me to Throughton, the famous maker of astronomical instruments, about whom he told me beforehand that he had not yet risen as it was not yet 12 o'clock; however, he left my card and will take care to acquaint me more closely with this excellent artisan. Another day, I am to eat both lunch and dinner with the same South so that he can show me all the remarkable sights in that distant part of the city where he lives. The same day when I made the acquaintance of South at Herschel's, I also met a Mr. Babbage, who greeted me by requesting a sample of my handwriting with my name, the year of my birth, and

44. Here HCØ uses the term *fjerdingvej* = 1883 m.

the like, but later he also invited me to visit him and showed me a machine which he had invented to perform all kinds of calculations. With this machine he can calculate all kinds of tables which are used in mathematics, and while the calculation is being performed, the entire table is printed out by the machine. I know that this almost seems like magic, but the matter in itself is much simpler than many would believe; but without a detailed drawing, the description would hardly be clear. I was also shown a new and wonderful scale which can be made very inexpensively; I shall bring one with me.

I feel that my letter is becoming somewhat disorderly, but I must return to Herschel again. He has shown me a beautiful sight by taking me out on the Thames in order to show me London's beautiful bridges from the water. I have later repeated this tour and used it both for pleasure and for time-saving since, as I said before, it shortens many trips. No city has so many masterly bridges. In a quarter of an hour one can be rowed under 5 bridges: Westminster Bridge, Waterloo Bridge, Bla[c]kfriars Bridge, Southwark Bridge, and London Bridge. One does not always go under the last of these, and people like me, who do not have to go farther, stop there because it is dangerous. This bridge, the oldest of the ones I have mentioned here, is built upon such a large number of pillars that the water there has become much narrower so that, at low and high tide, it often rushes through the small arches under the bridge with considerable force and causes numerous accidents each year. – Seeing the new bridges, Waterloo Bridge (which is almost 1/8 mile long) and Southwark Bridge, which is not much shorter, one sees the enormous distance between the art of 150 years ago, when London Bridge was built, and the art of our time. London Bridge stands on innumerable thick columns and therefore has very small arches. Waterloo Bridge stands on columns that hardly occupy 1/5 of the space that London Bridge uses, and its 9 beautiful flat-vaulted arches, each of which is about 2 or 3 hundred feet long, make a magnificent impression on the eye. The slightly newer Southwark Bridge has only 3 arches, each 700 feet long[45]. The arches are of cast iron.

45. Waterloo Bridge had 9 spans of 120 feet each. Southwark Bridge had 3 spans of 240 feet each.

The enormous mass of iron was so finely calculated and carried out in all its parts that when everything was set in place, and the support in the middle of the arches was removed, the top of the arches sank only 1 7/8 inch, which is almost imperceptible over a length of 700 feet. I fear than I may almost bore you with such a description, and yet I do not know how I should otherwise give you an idea of the grandeur of enterprise and art here without speaking about such things a little elaborately.

In order not to keep you any longer with the mechanical arts, I shall turn to an application of the fine arts. These may not be in such excellent condition in England, but here I want to mention a worthy application of them. I have seen the famous Westminster Abbey. It is a large church, where England's noteworthy men are laid to rest and a monument erected to them. One sees Shakespeare's memorial and also the memorials for Milton, Dryden, Addison and many other poets and great minds. You can easily imagine that Neuton's [sic] memorial is not lacking here. Statesmen of the most disparate opinions, e.g. Minister Pitt and his opponent Fox, lie peacefully together here. Each of them has his honourable memorial. The country's war heroes on land and at sea are also to be found here, as one would expect. Some of the monuments have been erected by the families of the deceased, but on others one reads the beautiful words "erected by King and Parliament". Thus England's great men end their careers with their ashes laid in the resting place of kings and with a grateful fatherland erecting a memorial for them. I do not know if there is any other country where this happens.

Before I close, I must tell you that the Royal Institution, a society for experimental natural science, has elected me honorary member. I shall have to tell you about this remarkable institute and about the London Institution in my next letter. I shall also tell you about the Travellers' Club, which is a quite remarkable organisation. For now I must close and ask you to give my regards to all good friends, especially Anders and Mathilde, Mother and Bodil, your sister and her children; love to Karen, Christian, Marie, Sophie and Søren, and especially to you, my good Gitte. I so often wish that I could have you here and show you some of London's

splendours. I am happy that the time is now approaching when I can tell you about them and all the extraordinary events on my journey in person.
Your
H. C. Ørsted

Give my regards to Forchhammer. He will soon receive a letter from Philips. I think that everything will be as he wishes.

London, May 27th 1823

Dearest Gitte,
Since I last wrote to you, I have been on a trip. I have been in Cambridge and seen the institutions of this old university. It is so much stranger to us because it differs greatly from ours in so many ways. In German books, I have often read the biased reports about it and about Oxford, that they have an old-fashioned and monastic organisation. While this may be true, it shows only one side of the matter. I shall give you a brief, and certainly in many regards incomplete, report about Cambridge here, but it will have the characteristic that I shall tell nothing other than what I have seen and experienced there. Cambridge is a small town, at least for England. It has between 10,000 and 14,000 residents and can therefore be compared with Odense in population. It is not known for trade or manufacture but can be regarded as a university town that has little business other than the university, which has 1400 students. Most of these live in colleges, where they study under the supervision of older students, who are their advisors and teachers. The colleges are very large buildings, and some of them contain several hundred students, all of whom live in their own quarters. I was most often in *Trinity Colledge* [sic]. I greatly enjoyed the magnificent airy court with green areas, magnificent vaulted arcades for strolling, and a calm that was good for me after having stayed so long in the London noise. Right next to this and the many other colleges is an extensive walk, or collection of walks, shaded by the most beautiful trees. As I walked there, I thought if only Gitte were here; but immediately after I thought I wish she were not here, for otherwise I think she would want me to strive to become a professor at Cambridge. How-

ever, I must say that the role of the professors is far less important than that of the tutors, for only a few listen to lectures from the professors. Instruction is limited to a few subjects. In the first year students continue their studies of Latin, Greek and mathematics, in the 3 ½ following years they are only required to learn more Greek and mathematics. They are examined at the end of each year. The most important part of the instruction consists not of lectures but of study at home in their rooms and of examinations and exercises that the tutors hold with them. I was so fortunate as to come at examination time. The examination was mostly written. They were given many questions twice each day. The questions were printed, and I acquired copies of them, which I shall bring home for the edification of my colleagues. The oral examination consisted only in questions regarding the written answers. I do not believe that one would demand more Greek from a philologist at a *Magisterconferents*[46] than is demanded here of those who have studied for 4 years but have indeed spent all their time on Greek and mathematics. The mathematical questions were similarly comprehensive. When the students have passed this examination well or tolerably, they receive the baccalaureate degree, which we have abolished, but which in its time was considered to be quite easily obtained. Professional studies are not really offered at this university. There is only one professor of medicine, and he is superfluous. Medicine is studied at the hospitals in London or at Edinburgh University. Ecclesiastical preparations are present only in the form of the study of Latin and Greek and a few theological lectures. Law is studied only in the courts and in other practical legal institutions. I must repeat that I do not deny that this arrangement is one-sided, and there might be many bad consequences if we were to imitate it, but to its credit it must be said that the youth here benefit from two of the best preparations for future advancement in the sciences, namely the classical languages and mathematics. I think that we spend too little time on the sciences that are necessary for a general education, but I also think that they spend too much time on it here and in far too one-sided a manner. 4 ½ years of a man's best age, from 18 to 22 for example, is

46. The Danish equivalent of a final Ph.D. examination.

a long time that must be used with the greatest care. – Cambridge has a good library of 140,000 volumes. Recently they have also obtained a collection of paintings, which is not yet significant, but for which the same man who has given the collection has reserved 60,000 pounds sterling, or about 6 ½ hundred thousand rix-dollars, for construction and the growth of the collection. They also have a collection of physical instruments here but nothing significant. I did not see the mineral collection. A new observatory is now being built here on a very well-situated free space at some distance from the town. It seems that this observatory will be excellent. – I was very well received here. I came to Cambridge with one of the many coaches that travel along all the highways. I left London at 10 o'clock and was in Cambridge 11 ½ Danish miles away by 4 o'clock in the afternoon. I was immediately received by a Doctor Peacock, who had been informed of my arrival, and a dinner table with interesting guests awaited me at 6 o'clock. There I met Professor Cumming, the chemist here, Wewhel [sic], a mathematician who has written a good book on mechanics[47] which he gave me; Sedgweek, a professor in geognosy, Henslov, a mineralogist; Hare, a philologist, whose brother is a disciple of Lehmann, as is he in part. He speaks German well and has a good German library. The next day I had lunch with Cumming and saw some of his experiments. I ate dinner in the hall of the college (Trinity College), where a couple of hundred students and teachers ate at different tables. On the third day of my stay there I was also invited both to lunch and dinner. In the evening I had a very long discussion, in English, with Wewhel about the more recent philosophy, from 9 to 12 o'clock. Naturally, we ended with differing opinions just as **Thode** has said long ago about scholarly wars, but Hare said that he had learned much from it.

I had much to tell you from London, but it is late; I must close for tonight and ask you to give my regards to all good friends; and especially Anders and Mathilde, Mother and Bodil, your sister and her children; our own Karen, Christian, Marie, Sophie, Søren are not to be forgotten. Regards to both Zeise and Forchhammer; I

47. *An Elementary Treatise on Mechanics* (1819).

would promise them letters from me soon if I thought that I could keep the promise. Finally, receive the most heartfelt greetings yourself, my dear Gitte, from
Your
H. C. Ørsted.

London, May 27th 1823

Dearest Gitte,
Your last letter has pleased me very much. I had really begun to believe that you had done me an injustice and blamed me for a delay in my journey which circumstances made if not necessary at least very useful, but I now see my old Gitte again. The letter shown is of no consequence; perhaps what I did not want and should not want can be good: now it has been decided by chance. I long more for you and the children every day. It will be a kind of heaven for me to come back even though I am well here. – My friends, who have so strongly recommended exercise for me, should be pleased to see me here, but I also notice that I am becoming thin because of it so that I really seem to notice that I am getting some wrinkles and look older; nevertheless everyone thinks I am younger than I am. As I do not consider it good to change too quickly, I have recently taken carriages more often when I have long trips of ¾ or 1 mile, for example. I have not since felt so overtired in the evening as before. – Otherwise, I am well and have been throughout this journey. Sometimes I get a bit hoarse, just as in Copenhagen, but as I have no lectures, it does not matter. I am planning to leave London in 2 weeks or thereabout and travel with steam-boat to Edinburg. I shall then travel back by land. I am planning to stay in Edinburg only 8 to 10 days, and I shall limit myself to visiting only a few places on my return journey rather than return too late. It will soon be half past eleven, and I shall rise tomorrow at 6 o'clock. Therefore I must close. I embrace you in my thoughts.
Your
H. C. Ørsted.

London, June 9th 1823

Dearest Gitte,

I feel that now, after having been in London for four weeks, I am beginning to have as much trouble with my correspondence as in Paris. Almost every moment is occupied. Nevertheless, I shall attempt to repair the omission, if not on this post day, then the next. I shall begin by mentioning briefly some of the remarkable things I have seen here. I do not recall with certainty if I told you in my last letter that I have seen the observatory in Greenwich, Barckley's enormous brewery, the monument for the London fire that took place in 1666, Guy's Hospital, St. George's Hospital, Parliament; I almost believe that I have not but only intended to. In any case, I shall not speak more about them here but refer you to the oral description that I shall be able to give you in a few months. I shall then choose from among the others. Among the beautiful memorials to the common good and the growing interest in the sciences, of which the English erect several every year, is the London Institution, an organisation which gives lectures attended by both sexes, and from which much beautiful and useful if not penetrating knowledge is spread. The first organisation of this sort was the Royal Institution, followed by the London Institution; and since then other parts of the city have got similar organisations, which do not all thrive equally well, but which still often find new support when they can no longer survive. The London Institution is a building that could well pass for a palace, it has magnificent reading rooms and other scientific aids; among other things, it has an excellent collection of physical instruments. I clearly remember having spoken of this in one of my earlier letters, but I cannot refrain from returning to this subject now as I want to tell you that I was recently there to see some galvano-magnetic experiments performed on a very large scale. A party had been properly invited to this end; Barlow, who has performed many magnetic experiments, Pepys, Dr. Birkbek, Childern and many more were there. The experiments were beautiful and showed how such an institution also benefits science itself. I have seen Taylor's oil-gas apparatus; but as you have seen our small one, I shall be content with telling you that he was the first to carry out this idea and on a very large scale, too. The cleanliness and the

neatness of his workshop are admirable. Dr. Woolaston has taken me to a remarkable sugar refinery where they boil the sugar in closed vats from which an air pump, driven by a steam engine, unceasingly pumps the air so that the sugar boils at a heat that we would merely call lukewarm. I would scarcely have believed that this would work so well, I mean that the vats would remain so constantly tight and capable of keeping out the air as I see they really are. Woolaston also took me to the great West India Dock, a basin where the largest ships can go to receive or discharge their cargo. When I come home, I shall show you on the map of London's environs how large its extent is. I see that I must pass over many things in order tell you why I end my letter here. I have made the acquaintance of a young Englishman by the name of Wheatstone, who has made many remarkable discoveries about sound and tones. He has no acquaintances among the scholars here, so I have been able to give him useful advice regarding the way to make his discovery public. He is with me at this very moment in order to read to me what he has written, and I cannot ask him to postpone it as he is just about to leave town. Therefore, I must close. Give my love to Anders and Mathilde, Mother and Bodil, your sister and her children, ours: Karen, Christian, Marie, Sophie, Søren. Regards to all good friends, and especially love to you from
Your
H. C. Ørsted

London, June 15th 1823

Dearest Gitte,
My last two letters have been finished with such haste that I have told you little of what has happened to and for me during the past 2 weeks; and now that I intend to repair the omission, I am uncertain in most respects as to what I have told you before and what not. In my last letters I have not told you about the parties to which I have been invited; as I see the same faces at most of them, this cannot be of much interest. I do not refuse invitations, for the company of the most interesting men who usually come to the parties to which I am invited cannot be a waste of time, least of all because their dinner parties do not begin until 6 o'clock, when all business is finished. I

shall mention the parties I have attended since June 1st so that you can see how I flutter about. 1st dinner with Taylor, 2nd with Philips, 4th with Wollaston, 5th in the Royal Society's Club, 6th evening with Dr. de Sanctis, 7th in Wo[o]lwich with Barlow, 8th with South, 9th evening with Davy, 11th with Count Moltke at a ball in a club called Club Almarch (NB watched but did not dance, as I hope you can guess), 12th Royal Society's Club, 14th large annual celebration at Gre[e]nwich with the same Society, so nourishing for both body and soul, the 15th to dinner with Guillemard, a geognost. You would be frightened by so much dining out if I had not already told you that people here eat only a few simple and nourishing courses. One also has the advantage that there is no urging; one asks for what one wants of the few dishes set forth. Drinking is about as modest as my medical friends could wish it. My red wine from Froelich will taste twice as good after this journey, for even in Paris I hardly ever found the ordinary table wine as good. – Many of the dinner parties are accompanied by some communication or other. At Wollaston's I saw a couple of interesting experiments, at South's astronomical observations, at Taylor's his oil-gas apparatus; the Woolwich Arsenal with the benefit of Barlow's guidance. Regarding the party at Gre[e]nwich, I must tell you a little more since it lasted an entire day and was interesting in many ways. The Royal Society in London supervises the famed astronomical observatory in Gre[e]nwich and visits it once a year. On the morning of that day, I was invited to South for lunch with Herschel and Babbage. On this occasion I showed them the new experiments on the theory of sound which the young Englishman I mentioned in my last letter has devised, and I had a long but friendly disagreement with Herschel on this account. Around 12 o'clock we got into a boat and were rowed to Gre[e]nwich, which took about 5/4 hours. I mention this so elaborately in order to tell you that all the way the Thames was strewn, as it were, with ships, we even encountered three steam-ships, among them one entirely of iron. The wealth of buildings, warehouses, ships, docks etc. seen by the traveller along this route is enormous; the activity that has created them and keeps them in unceasing use is admirable. At Gre[e]nwich there is a hospital, or rather a refuge for old and infirm sailors. A former palace, more beautiful than any of those owned by the

Royal Family itself, has been granted to them for this purpose. The inspection of the observatory had gathered almost all active members of the Royal Soc. I was one of the party, as a member. The inspection may not matter a great deal, but the Society's **Council**, a committee of its members, regards the matter more seriously and likes to take the opportunity to suggest the acquisition of new instruments and other aids which the astronomer wants. The Society gathers for a meal after the meeting. People were in very high spirits, and many toasts were drunk. This does not proceed in brevity. He who proposes a toast makes a little speech; he who receives it answers with a speech. Davy, the President of the Society, proposed a toast in which he recalled that Prince Christian had been present at such a meeting one year ago, mentioned that I was now present, and that I, as Secretary for the Royal Danish Academy in Copenhagen, represented it here, and in this connection he proposed that we should drink a toast. I then rose and answered: "I thank you for this honourable toast from the bottom of my heart. I regret that I cannot speak the language of this happy land with the ease that I would wish in order to express my feelings; but I must limit myself to expressing the wish that this country, the fatherland of Baco and Newton, which has produced so many magnificent men who have spread light upon the sciences, may always continue to produce great men for the advancement of science and the honour of the country." This may sound somewhat affected to you, but as I had to speak unexpectedly, you can be sure that it sounded more natural. One of my friends, Babbage, assured me that everyone had found my speech to be the best of all those delivered at that meal. I always subtract a great deal from such compliments, but I conclude from it that my speech was tolerable, and that was all that I wished. – After the meal I, along with South, Herschel and several others, made use of one of the Admiralty boats that had been placed at the disposal of the Society for the day. By coincidence I boarded a boat that had been built by Prince Jørgen[48], a Danish prince, who was the husband of Queen Anna, and an English admiral. He had worked on it in person.

48. Prince George (1653-1708), British Prince Consort, married to Princess Anne (1665-1714), Queen of England and Scotland in 1702.

Among the remarkable things I have seen here, the mint deserves to be mentioned. It is particularly remarkable in that there is so much activity, and not just in striking copper and silver coins but also gold coins. Gold is now extremely common in England. The mint machinery would have been more remarkable for me if our Danish machinery had not been made in England and therefore provided an example of such perfection.

Woolwich, which I mentioned at the beginning of my letter, offers a remarkable sight. The enormous number of cannon that were necessary during the long war years were bored and finished here. An almost endless line of cannon, shot piles, mortars, bombs, fire rockets etc. can be found stored here on a piece of land that could easily be a large field. They have started to build a remarkable collection of models here. A military academy is also here. However, almost everything stands still now in peace time; even the academy is unable to place its cadets so that one fears that the government, which is not so concerned about the sciences as ours, will allow it to be closed.

As I do not see the time to fill a new sheet, I shall close here in order to say something to you that I know you will want to know. I shall leave London on June 21st and travel with the best of the three big steam-boats that go to Edinbourg. My intention is to stay there only 1 week. From there I go to Glasgow, Liverpool, Birmingham, Oxford, back to London. I intend to stay one or two days at each of these places so that I can return to London after 3 or 4 weeks. London will then be empty of scholars, who are in the country at that time; so I shall have no reason to tarry there but shall return to Denmark, for which I long with growing impatience. If everything goes according to my wishes, I shall be there before August 14th, but I see that it is not possible to be assured against all delay: however, I really hope to manage it.

Yesterday I received a letter from Gay Lussac, who informed me that I have been elected to the vacant seat in the physical section of the Institute. As usual many candidates were named, but I received 51 of the 52 votes, which is a majority of such distinction as rarely happens. Professor Müller likes to have such reports immediately

for the *Literary Times*[49] so that it will not reach the Danish public first through German newspapers. Therefore I ask you to let him know the sooner the better. – Now give my regards to all good friends, and especially Anders and Mathilde, Mother and Bodil, your sister and her children. Give my love to our Karen, Christian, Marie, Sophie, Søren. And above all, love to you, my dear Gitte, from
Your
H. C. Ørsted.

London, June 16th 1823

Dearest Gitte,
Last time you received a very short letter from me, but I hope that I can send you a longer one this time, even if not so long as it should be if I could follow my inclination to talk with you. I am in constant activity and enjoy it. Without this, being so far from you and the children would be insufferable, or rather, it would soon be ended. I use some of the time to learn English as well as possible in such a short time, but for this I use hours when there is nothing to see here; that is, in the morning from 6 to 8 o'clock. People here think that I have made quite substantial progress in this short time, and I can feel it myself. I am glad that I have made the decision to occupy myself with this so seriously, for I feel that it contributes greatly to making me appreciated here. I shall perhaps even derive another important advantage from it. I have every reason to hope that I may become a collaborator in one of the big encyclopædias and receive 15 guineas per sheet, which is 120 Rbd in our currency. I am sure you will not expect me to write myself rich with this, but if I only write 4 or 5 sheets each year, I shall be able to get the most important English books; and I can tell you that it is a great shortcoming of Danish, German and French scholars that they know so little of what is being done in England. In many respects I shall be able to benefit my native land far more than before if I can get an English library as good as my German. – I shall soon need more space, especially as I wish to have a little room for experiments completely

49. *Dansk Litteratur-Tidende*, Danish periodical (1810-36).

to myself. If Forchhammer moves to the rooms he has as arcanist at the porcelain factory, I do not believe that it would be worthwhile to rent them out; but so long as he wishes to live there, I shall manage as best I can. Few are as comfortable as I, but it is only with regard to utility that I wish for better.

I am glad that you are enjoying the country with the children; wean Christian from his habit of whimpering that you write about; I know that you can do this in some clever way. Imagine that I had some unreasonableness or obstinacy (it is obvious that I have none, one does not admit to such things), should you not be able to wean me from it if you wanted? Well, wean the little chap from his habit of whimpering before he notices. I would not like to be strict as soon as I come home. However, everything will be fine. It is my intention to pay as much attention to the children as I can when I come home; I would particularly like to make Christian a well-behaved favourite of mine. I miss you all very much, my dear ones; when I have time to collect myself, I often feel a homesickness that I will not allow to increase much longer. Farewell until then, my Gitte; but no, you shall still have many more letters from
Your
H. C. Ørsted.

London, June 24th 1823

Dearest Gitte,
I am finally leaving London. This evening I shall board the steamboat James Watt, the best of all the steam-ships that go to Edinburg, which are all excellent, by the way. It recently made the journey in 48 hours, but it is usually 60 hours. I shall write to you as soon as I arrive in Edinburg, but you must be aware that my letters will now take longer. Since I last wrote to you, most of my time has been occupied with paying visits, with seeing several things again etc. I shall not detain you by telling you about all such things, which are trifles in description but often important in their consequences. Thus I now have a quite exact knowledge of the manner in which iron pipes for water mains should be laid and joined, of which the latter is very important and done here in a very secure and simple manner. The method which one would otherwise be tempted to

adopt in Copenhagen would be subject to disturbances with every change from one season to another. I mention precisely this matter because it is one of my official duties. I have often visited **Parkins'** steam-engine with renewed interest. He has promised me that, if we want a steam-ship of his invention in Copenhagen, it shall be the first one he makes except, of course, for his own. His steam-engine will only cost half of what the others cost and requires less space and only 1/10 of the fuel. – Here I leave such important matters for a moment in order to tell you that here in London I have often been in the company of two charming French ladies, whom I merely mentioned in the previous letters: Madame Thenard and Madame Laurent. If there was something to see or a visit to pay for both these ladies and me, I was their companion. We often debated the merits of France or England. However, I was always satisfied with demonstrating that England ceded nothing to France, but nevertheless they declared that I was partisan. Finally I decided to leave them with a reminder of my impartiality. As a parting gift, I gave each of them a book with a well-known verse by Wessel, the first verse of the song: *Braadne Kar i alle Lande*[50], which I translated for them into French verse that they found quite good. Was I infatuated with these ladies? No, my good Gitte, if I had been, I would soon have become extremely jealous; for they had a great many admirers, and I am not like Baggesen, who would prefer to see the entire earth kneeling before his goddess. On the other hand, I took much pleasure from being their friend, and I think they recognised this. An old gentleman, Sir John Sebright, who did many favours for them because of his infatuation, was called their obedient servant; a young gentleman, Mr. Bachelier (not related to the one in Copenhagen), was called their courier, and I their companion. They sought my advice on every occasion, without following it of course, and wanted me to bring you and the children to Paris some day. I must finally remark that their behaviour in itself was exemplary although part of their circle was not to my taste. I see that this letter has become too confidential to be shown to anyone. What I have said about the ladies is, and also it would not be good for the Water

50. There are black sheep in every flock.

Commission to hear what I have done for it, or With to hear what I have done about the steam-boat until I come home. So you shall get an extremely hurried public letter today.
Your
H. C. Ørsted

London, June 24th 1823

Dearest Gitte,
I am using the few minutes that the hour of departure leaves me in order to tell you that I shall board the steam-boat James Watt this evening and hope to be in Edinburgh by Friday morning. I am ashamed to send such an empty letter as the one today on such a long journey, but rather some news than none at all. I still count on coming to Copenhagen before August 14th; but if I am forced to come later, it will only be very little. You shall hear from me as often as possible; if some irregularity occurs, you must consider that the journey often makes a regular correspondence impossible.

Give my regards to all good friends and especially Anders and Mathilde, Mother and Bodil, your sister and her children. Love to Karen, Christian, Marie, Sophie. Tell Søren that he has my permission to go to Langeland during the holidays. With special love to you, my Gitte, from
Your
H. C. Ørsted

Give my regards to Forchhammer and congratulate him on his lectureship. Tell him that I have not forgotten his commissions. He shall have a letter from me from Scotland.

Edinburgh, June 28th 1823

Dearest Gitte,
I now have the pleasure of writing to you from Edinburgh. I have had the most beautiful journey here that anyone could wish. Between 12 and 1 at night I arrived at the steam-ship, which was berthed more than one Danish mile from my home, and went to bed if not as well as at home, at least well enough to sleep until about 5 o'clock, when I rose to see the country surrounding the Thames as the ship

went down the river. On board I immediately met a Mr. Allan, a famous banker and also mineralogist, whom I had seen in London's learned societies. He endeavoured to make the trip as enjoyable for me as he could and continually turned my attention to remarkable things. I soon became acquainted with many others, among whom I shall mention an Arburthnot, who has been in East India for many years, and who knew Professor Rask, whom he sent his regards. The steam-ship James Watt, with which I made the journey, is very big and well appointed. The deck is so large that, although 5 carriages stood on it, one scarcely noticed that any of the space was occupied, and one strolled up and down with the greatest ease. One of the main pleasures one has on such journeys is reading. One saw gentlemen and ladies with books in their hands, and the steam-ship has a small library, stamped with the name of the ship. However, one could not endure reading for very long at a time because it was far too cold even though the weather was otherwise beautiful. I had taken books along myself and read almost as much as I have the peace to do on a normal Copenhagen day. The sail down the Thames is remarkable for the many things one sees on the coast and the many ships one meets. Over the short distance of 8 to 10 Danish miles one sees on the right bank of the river alone: Deptford, Gre[e]nwich, Woolwich, Gravesend. One does not see so much along the sea-coast from the mouth of the Thames to Edinburgh, partly because one often sails far from the coast, partly and primarily because most of the important towns lie in bays and river mouths. However, the traveller will miss nothing of interest along the coast if only he pays attention, for a sea chart was displayed, on which we could always see where we were. The liveliness of trade here can be seen from the fact that we once counted 300 ships in the vicinity of **Newcastle**. – We covered the distance from London to Edinburgh in 50 hours. As it is more than 100 Danish miles, it is evident that this is a fast journey. The usual time is 60 hours, but one of these ships recently had such a hard passage that the travellers, who had departed from London on Saturday did not arrive here until Thursday; while I, who had left on Wednesday, arrived on Friday. If I had followed my plan of departing on Saturday to end the journey sooner, I would only have shortened it by a single day, so I must praise

my luck. The passage-money from London to Edinburgh is 4½ pounds sterling, around 22 *species*. For this, one also gets lunch, consisting of tea, bread, butter, eggs, and some meat or ham, and similarly dinner and evening tea are included in the price. Wine is paid separately, but when you consider that they take in more than 2,000 *species* and make a similar trip back a few days later, you can easily see the great profit that the partnership must receive. This way of travelling now meets with so much approval that the partnership is building a new steam-boat in order to go twice a week from London to Edinburgh. As soon as we arrived in Edinburgh, Allan arranged to get me good lodgings, where I only pay 1 guinea, about 5 *species*, a week, and where I even live magnificently for this (here) insignificant rent. Allan immediately sent a messenger to Brewster and let him know that I had arrived. Brewster soon came to me, took me home with him, and accompanied me out to see the city. The city is beautiful, especially the new part of it. The houses are built of hewn stone, of which the region here has plenty, and one finds them altogether more beautiful and especially constructed with better proportions than those in London. I think that the Scottish have better artistic taste than the English. At Allan's and Brewster's I saw some paintings by Scottish masters that were not to be disdained. – **Brewster** is a very excellent man and extremely obliging. He asks me to send regards to Forchhammer and also to thank him for the minerals he sent.

However, I should not postpone too long telling you that today I have seen Walter Scot[t], with whom I really ought to have begun my letter if it had not been too much out of chronological order. This time I saw him for only a few minutes and in the street, where Dr. **Brewster** presented me to him. I immediately conveyed compliments to him from Oehlenschlæger and told him how highly my friend esteemed him, whereupon he very warmly expressed how highly he prizes Oehlenschlæger. He told me that he had decided to write him a long letter, but that he had postponed it longer than he had wanted to. He is going into the country just now but will return in three days; I shall visit him then and talk with him as much as possible. Walter Scot[t] is disliked by the Opposition because he is a strong supporter of the Government, but Dr. Brewster excused

him by saying that it could well be necessary to have a strong resistance to the very strong Opposition. I shall leave this undecided, but I was pleased to hear from Brewster that he regarded him as a man of excellent moral character, just as I would think him to be from his poems. – I cannot describe what he looks like as completely as I would like to since I saw him for such a short time. If I can obtain a good portrait of his soulful face, I shall get it for you. He is a heavy man, well-nourished without being fat, and limps severely. These, indeed, are merely the coincidences of the man's exterior, but I shall restrict myself to saying so little this time in order to avoid telling you anything that is incorrect about him. Another contingency, but a more amusing one, especially for him, is that he receives 3000 pounds sterling (14,000 *species*) for each of his novels. This is a handsome income since he writes a couple each year. If Oehlenschlæger could be paid as much for one of his works, he would be able to buy a country house in Denmark if he wanted to. – Dr. Brewster told me that he had recently read a translation of *Correggio*[51], which he believed was made by Walter Scott's son-in-law[52]. B. was very pleased with it.

You will hear more from me as soon as I have seen a little more here; for even if I am able to keep my intention of staying in Edinburgh for only a week, there will be material enough for a very long letter or rather for several. However, when there is too much material, I leave things out as you know, but then it will affect the physics: I promise you that.

Regards to all good friends and particularly Anders and Mathilde, Mother and Bodil, your sister and her children, and do not forget our own Karen, Christian, Marie, Sophie, Søren. Finally, love to you, my dear Gitte, from

Your

H. C. Ørsted

51. Tragedy by Adam Oehlenschläger (1811).

52. John Gibson Lockart (1794-1854), Scottish author and publisher, married to Scott's eldest daughter Sophia (1820). He collaborated with Oehlenschläger's translator, R. P. Gillies.

I must ask you to send me a money order for 100 *species*, the sooner the better, for the things I have acquired for our own use. The travelling fund is no longer able to cover the expense. Ø.

Edinburgh, June 28th 1823

Dearest Gitte,

Last time you received two rather hurried and partially incorrect letters, which I still hope were more welcome than none since you would otherwise have had to wait more than 1 week longer. You can see where I am now. I have been received most excellently here, and Dr. Brewster makes every effort to enable me to profit much from Edinburgh in a short time. Every further part of my journey is to be regarded as part of my journey home. I shall hasten it as much as my travel obligations permit. I am reluctant to give up enjoying August 14th in Copenhagen, but I cannot be absolutely sure; however, I shall make every effort: so that even if I should miss the day, I shall come not long after. You talk of meeting me in Hamburg and of bringing the children along. If you want to do this and think that it is feasible to bring the children, you will all be heartily welcome. I shall get to see you so much sooner. If, on the other hand, you find that you are less inclined to do it as the time approaches, then stay at home, and I may not have the advantage of seeing you quite so soon; but I shall embrace you in our home, which has a pleasure of its own. You see that I know how to find an advantage in whichever of the two decisions you make. I see from your last letter that you would enjoy the tranquility, of which I write, that rests on the surroundings in Cambridge. Do not imagine that there is any tranquility in the social life. Wherever I go, I immediately become involved in acquaintances, and it will be the same for you although you take less pleasure in it. Grasp my resolution; enjoy yourself with things that cannot be otherwise, and rest in between from the swarms as I do. Just let me come home, and I shall at least help you to bear the burdens of social life with my cheerfulness; that is to say, as hitherto, not while people are there but before and after. For the expenses of our own incurred during the journey, I must have a money order for 100 *species* for London. Oblige me by attending to this, the sooner the better; for I hope that my departure from London will be near

2 weeks after you have received this letter. I mention the money in my other letter so that you will not have to show this.

Be well, my Gitte, and you may soon expect to see
Your
H. C. Ørsted

Glasgow, July 8th 1823

Dearest Gitte,
The time I have spent in Edinburgh has been so filled with remarkable things that I have not had the opportunity to write you a single word about them, except in the first days. It is almost the same in Glasgow; however, I shall take the bull by the horns and rather write you an incomplete letter than none. The day after I sent you my last letter was a Sunday, June 29th. On that day everything in England is so quiet, all business is put aside so completely that people in Copenhagen can have only a very imperfect idea of an English Sunday. Brewster fetched me in order to go to church. I heard a very good sermon by a clergyman called Thomson, even though he read it from his script, which is said to be quite common here. In the evening I dined at Allan's along with Brewster. I found here a very good sculptor Joseph, who has made a considerable number of busts of famous men here. The following day, June 30th, I visited him and saw a large collection of his works. He then took me to a painter, where I saw a great many portraits. It is a custom here that people leave their portraits with the painter. The family takes the portrait only after the death of the subject. Joseph and the painter took me to a society for the abolition of the slavery of Negroes. I heard here one of Edinburgh's best orators, Cockburn, who showed with much eloquence how one must strive gradually to give the Negroes the freedom that they could not possibly enjoy all at once. On the same day I went with Brewster to a clock-maker who had many different, partly new, types of clocks that testified to his competence and ingenuity. His room was filled with portraits of famous clockmakers. Thus everyone honours his trade in England. I dined at Brewster's with several interesting men whom I shall otherwise have occasion to mention in the following. I spent the morning of July 1st with Brewster, who showed me his fine optical experiments. This

was a very pleasurable day for me. In the evening, I had dinner, as we call it, with one Stewenson, with whom Brewster had acquainted me. I saw here a piano that does not need to be tuned because the strings are fastened to an iron frame, whose ends even further are held rigidly away from each other by curved, hollow metal rods.

On July 2nd, my friends had arranged things for me so that I first had luncheon with Robison and Brewster, who then took me to the water mains. We made this little tour on a canal in a boat that was drawn by horses. At some places, this canal goes over the road or over a river. Imagine that at one place the canal goes over a sunken road so that one can hear carriages driving under the canal. Here the canal goes over brick arches, and the canal-trough, I do not know a better name for it, is made of iron. In the same way, this canal at one place crosses a deep-lying river. As soon as we came home from this tour, we went in another direction. We first visited the two Waddel brothers, two excellent engineers who live on their fortune but amuse themselves with scientific work. I saw there the model of a new kind of wheel for steam-ships. Instead of a steam-engine, they had a kind of clockwork that set the wheels in motion. It really seemed that a ship with this new kind of wheel went much faster than when the old ones were used. Some wind prevented precise experiments. From here we went to the dock at Leith, which is in the vicinity of the Waddels' country house. We also saw the long chain bridge at Leith. This kind of bridge is perhaps the least expensive that can be built. We ended the day by having dinner with the surgeon Professor Russell, who has his country house near Leith. – On July 3rd I saw the University Museum, which is still in its infancy; for the magnificent University building is as yet only three-quarters finished, which is still quite considerable. The government will give 10,000 pounds, 45,000 *species*, annually until it is finished. The objects in the museum are displayed under glass so that one can see them without anyone being able to touch them. Like the birds in our museum. Jameson showed me the museum, Hope showed me the laboratory. His lectures are famous for his beautiful experiments; it is interesting to see how well he has prepared everything, but with an abundance that we cannot even think about, for he had arranged everything that belonged to the lectures for the whole year in well-

divided cabinets so that he, for example, had as many retorts as would be required if all of the lectures were to held at the same time. To this must be added a large reserve of glassware. I ate dinner with Robison, a very cultured man, whom I have often mentioned in this letter. He is the son of the previous professor of physics here but has himself been a soldier in East India and has amassed a great deal of money, on which he now lives. He has much worldly wisdom and fine taste. His table was the most tasteful and his courses the most exquisite that I have seen in England.

On July 4th it was finally possible for me to see Walter Scott. I had often called on him in vain because he constantly moved between his country house, which he is having built, and his house in town. The servant finally suggested that I come very early in the morning, when I met him. I talked with him mostly about **Oehlenschlager**, whom he prizes very highly as I have already said. As I intend to write about this to Oehlenschlæger, I shall not repeat it here. I must regret that I could only be with him for such a short time. He invited me to eat luncheon with him, but I had to deny myself the pleasure of accepting this invitation as I had some days before accepted another invitation from the mathematician, Professor Wallace. I must regret this especially as Walter Scott again went into the country the next day. He continues to maintain his anonymity. When Feldborg read him Oehlenschlæger's letter, in which his novels were described, he said: That must be very pleasant for the poet, whoever he is. When the King once complimented him on one of his novels, he answered: Your Majesty does me too much honour. He thus left it ambiguous whether he merely, as an author, declared the fame attributed to him to be too great, or whether he wanted to disclaim the honour of authorship altogether. – At Wallace's I saw an instrument that he has invented instead of the so-called pantograph for copying drawings, maps, and the like. With it he copied a drawing by Rembrandt, depicting his mother, in a few minutes and gave me this copy. – Feldborg, who now lives here, later took me to the Registry House, where all of the country's important documents are stored. They have begun to have them printed, and many folio volumes have already been printed, to the great relief of coming historians. – In the afternoon I performed experi-

ments with Brewster on the intensity of the compass needle in Edinburgh and ended the day by eating with Professor Hope, the chemist.

On Saturday I went to luncheon at Jameson's, where the party, against all luncheon traditions here, was very large but also interesting. I then took leave of Brewster, who was going to the country. We parted from each other with the same warmth with which we had lived together. I received from him a copy of the Encyclopædia Britannica, whose value in Danish currency is between 3 and 4 hundred *daler*, in return for which I must give him an article of two or three sheets on electromagnetism[53]. On the same day Feldborg and I visited Jemisson, a young man who has spent a long time in Germany, and who knows the Danish language and literature. I ate dinner with Sir John Sinclair, the famous writer on agriculture. His book has been translated into Danish as you know, but he did not have a copy of it, which he would very much like to have. Ask my brother or Forchhammer to mention this to Collin, who will certainly get one for him. At the party I found Sir William Hamilton, a man of excellent abilities and a connoisseur of German literature. There was music after dinner, and one of the daughters played a melody which is said to derive from Ossian[54]. Sinclair promised me a copy of this music for the pleasure of Oehlenschlager and other good people at home. On the 6th, a Sunday, Feldborg took me to a church where the service is held in accordance with the rites of the English high episcopal church. This service is very splendid and greatly resembles the Catholic. It may have been devised with great priestly wisdom, but with its unreasonably long prayers, this service does not seem to follow Christ's own teachings. After the service we went to Gill[i]es, who has translated many of Oehlenschlager's works. We had called on him many times in vain. He received me most amiably and invited us to dinner. In the meantime, we went out to Roslen Glen, a valley or rather a wide and wooded gorge, in

53. *Thermo-electricity* (1830), KM II, pp. 351-98 and JJK, pp. 542-80.

54. The narrator and presumed author of a cycle of poems which James MacPherson (1736-93) claimed to have found and translated from old Gaelic sources. Collected edition: *The Works of Ossian* (1765).

the vicinity of which are Lord Melville's castle and Hawt[h]ornden, where the poet Drummond lived. Its caves are said to have served to protect the Scots in times of unrest. The ruins of Roslin Castle and an exceedingly beautiful chapel which still retains most of its decorations merit attention here. – We returned very late to our evening meal, at 7 o'clock in the evening. I went home at about 9, packed, and at 10 ½ took my seat in the coach to **Glasgow**, where I arrived at 4 o'clock in the morning.

After some hours' rest I went to Robert Graham, whose son had given me a letter of introduction to him. He took me to Tennant, who most eagerly showed me his factory for bleaching salt, sulphuric acid, soda, and soap. He also showed me an iron foundry in the neighbourhood. The same day I also saw a machine for embroidery, the gas-works for the illumination of the town, and the University Museum. On the 8th I went to luncheon in the morning and later to dinner with him. With a letter from him I saw an ironworks, called the Clyde Ironworks, 1 ½ Danish miles from **Glasgow**. Next to it, there was also a coal-mine which I inspected. Imagine a well, almost 200 feet deep (which is called a shaft); one is lowered into this in baskets that hang in iron chains. Then one wanders around in the long underground passages which in this place have the inconvenience that it is only possible to walk upright in very few places. To walk thus bent over for a large part of 1 ½ hours is somewhat laborious. The completely black crew in these black caves makes a strange impression that is enhanced by the lamps that the workers have on their foreheads; this would look terrifying if one did not know what it was.

July 9th. Today I have seen a large calico print-works in **Barlow Green** about ½ Danish mile from the town. I shall eat dinner with **Tennant**. Tomorrow I shall visit Loch Lomond and the near-by cave of Robin the Red[55] on a steam-boat. I shall be accompanied by Mrs. Henderson and her daughter, who both ask to be remembered to Doctor Forchhammer. – The day after tomorrow I shall go by steam-ship to **Liverpool**; and then it will go faster and faster towards home.

55. Robert Roy MacGregor (ca. 1671-1734).

Regards to all good friends and particularly Anders and Mathilde, your sister and her children, Mother and Bodil, our Karen, Christian, Marie, Sophie, Søren. And, first and last, love to you, my dear Gitte, from
Your
H. C. Ørsted

Manchester, July 16th 1823[56]

Dearest Gitte,
I ended my journal last time on July 9th in Glasgow. I ate dinner with Tennant, whose family knows Dr. Forchhammer quite well. Tennant assured me that Forchhammer is his wife's favourite. After the meal the chemist Thomson arrived, recently returned from the country. I had to go home with him later and did not return to my lodgings until late. That did not prevent me from being on my feet the next morning at 4 o'clock and setting out for Loch Lomond at 5½ in the company of Mrs. Henderson, her daughter and her son-in-law Lamb. The journey first went down the Clyde to Dumbarton in a steam-ship, from there by coach to the lake Loch Lomond, which is connected to the Clyde by a small river. After a short stretch on the last part of this river, we came to a steam-ship which goes once around Loch Lomond every day. This lake has a length of about 4 Danish miles but is probably nowhere more than ¼ mile wide. It is surrounded by high mountains and strewn with small islands. The whole impression is more one of wild romanticism than of beauty in the strict meaning of the word. The mountains are not covered with woods but are almost completely bare. The day I visited them was a truly rainy day. The mountains were covered with clouds, many of which were much lower than the tops of the mountains. As a physicist, I had great pleasure in contemplating their variations and their transitions to showers. The most remarkable thing we saw was the cave of Robin the Red. You recall Walter Scott's novel[57]. Whether this cave has ever been inhabited by Robin remains unknown, but it would certainly have been very suitable. It is a truly rocky cave

56. Added in the margin: Next letter to Amsterdam to await me there poste restante.
57. *Rob Roy* (1817).

whose opening can only be approached from the sea on broken rocks, and descending from it is as difficult as ascending. Here, one man could defend himself against many. – Because of the rain we were forced to spend part of the time below deck, where I read a passage from Walter Scott's latest novel *Qvintin Durward*. The book was from the steam-ship's library, for all steam-ships have one of at least 20 or 30 volumes.

On the 11th I left Glasgow and first went with a steam-ship to Gre[e]nock, from where we were received by another steam-ship that was to take us to Liverpool. The journey on the Clyde was interesting enough. We saw a great many steam-ships going in and out of Glasgow. I heard that every day 25 ply the waters of this city, which has had great benefit from the introduction of steam-ships because the river close to Glasgow is not deep enough for larger ships. The steam-ships have so increased the city's coffers that it can now afford to dredge the river every year. The weather was most unfavourable, and everything prophesied a difficult journey, which we also had. The wind was violent, and the current was against us. We made so little headway in the evening that we had to turn around and put into port on a small island called Arran. The North Sea near England and Scotland is very violent and stormy. With any ship other than a steam-ship we would certainly have got nowhere; but we were able to go out again the next morning and made an uncomfortable but safe journey, first to Port Patrick, then to the Isle of Man, and finally to Liverpool, where all the passengers were pleased to arrive after having withstood 2 days of wind and sea which even experienced people called terrible; however, I cannot say that we, with our good steam-ship, were at any point in danger. In Liverpool Dr. Trail assured me that the famous and learned whaler Scoresby had once been out with him on a steam-ship in a storm, which Scoresby declared was the strongest he had ever endured. He also declared that another ship would not have withstood it nearly as well. I spent the 14th mostly with Dr. Trail, who showed me the botanical gardens here and other sights. Now Liverpool has also got an organisation of the same kind as the Royal Institution and the London Institution in London. It is an institution for education in all parts of natural science and related sciences. These institu-

tions will advance the natural sciences in England so that everyone who cares to learn something will acquire knowledge in them. The generosity with which the English work toward this goal does them credit. In Liverpool 224 men had given 100 pounds sterling each, about 1150 Rbd, together almost 4 hundred thousand Rbd. In addition to these institutions they have libraries with reading rooms that are always filled with readers. All this is accomplished by subscription. After I had eaten with Doctor Trail, he took me in his carriage to the docks around Liverpool. These docks are to be regarded as harbours built by art and extend here over more than ½ Danish mile. They were so full of ships that one could hardly believe that they were able to accommodate more. Liverpool is the largest commercial city in England after London. I saw the famous author Roscow in Liverpool.

On the 15th I travelled to Manchester, where I had indifferent fortune at the beginning. Neither Henry nor Dalton nor Dr. Holme, to whom I had letters, was at home. The inn was indifferent. I was prepared to leave the city the next morning when finally Dr. Holme came home unexpectedly, although to depart immediately again, but he gave me a letter to a Dr. Hardy, who later did significant favours for me in Manchester. The next morning I had luncheon with him, and he took me to several remarkable factories. I saw a remarkable factory with all kinds of looms and even working machines where the shuttles as well as the threads were moved only by machinery, indeed, where even the finest patterns were made by machines. I also saw a very remarkable map factory, with machines that made maps more accurately than would otherwise be the case. In the evening I dined at a large party, held in the honour of a surgeon, Turner, who had given lectures on anatomy to great praise. Although he had been paid for it, he was not only given this party, but he was also presented with a gold goblet worth 100 pounds. At table, where the drinking was quite heavy, someone asked me if we had such a beautiful goblet in Copenhagen. I answered him that I could not say with certainty. Our university had possessed one of a venerable age, presented by James the 1st of England, but the English Bombardment had destroyed it. I heard from the remarks that passed between persons at some distance from me that they very

much liked my answer to this inappropriate question. The goblet was presented to him with a short but beautiful speech by one of his listeners, after which he responded with a very beautiful and similarly short speech. All of this took place at table, and naturally the speeches were extemporaneous. A great many toasts were then drunk, each with a speech. My health was also drunk, whereupon I thanked them and said that it would always remain a pleasant memory to have been in this party of such enlightened men, gathered to honour science. "I seize this opportunity," I added, "to greet this city, which has so long distinguished itself in the history of industry and been remarkable for its men of science. I must also take the pleasure of congratulating the man whom this party honours, and who has now achieved a name among his fellow citizens which I certainly hope that he will expand to the entire scholarly world in the future." As I do not remember the other speeches but still want to give you an impression of the party, you will have to be content with mine. All the speeches met with more or less applause, as did mine, and several said "bravo". This may seem ridiculous to you; therefore I must at least note that this does not happen with loud shouts but rather as when one person says it to another. On the 17th I had luncheon with Turner, then saw an extremely large and well-appointed cotton mill belonging to one Murray, and I ate dinner with one Eward, an excellent engineer. As Dalton had just returned home, I also met him there. I could have completed my visit to Manchester with these two days if I had not been forced to add a little for Dalton, who had returned, and for Henry, who was going to return. On the 18th I had luncheon with Dalton and saw some of his experiments afterwards. In the evening I was invited to one Naylor, where Parkes, the author of *The Chemical Catechism*, also came. We had a very long scientific conversation in the evening. On the same day I had seen Hoyle's large print- and dye-works. On the 19th I saw a Manchester factory. Went to luncheon and dinner at Hardy's, and in the evening at He[n]ry's; Dalton and a young scholar, Davies, were also at Henry's. The conversation was scientific all evening. – Dr. Hardy has invented a belt which, according to the evidence of 300 cases, can protect against sea-sickness. It acts merely by pressure on the stomach and abdomen. This evening, the 19th, I am in

Derby, where I have seen a Mr. Strutt, who is a very interesting and also very rich man. He has worked much on heating rooms with air. The matter has now progressed to the point where a man makes a living installing such devices in institutions and large houses. Several hospitals are heated in this manner. Several illnesses can be cured more quickly in rooms so heated than in others for the good reason that a warm breeze blows on the patients here, instead of a cold breeze in the other rooms. – Early tomorrow I am going to Birmingham, where I shall arrive at 3 o'clock, so I can already make some visits there tomorrow.

You see that I am coming closer to home with giant steps. In 1 week I hope to tell you when I shall leave London. It will hardly be possible for me to be there for the 14th, but I do not think it will be many days later. Regards to all good friends and particularly Anders and Mathilde, Mother and Bodil, your sister and her children. Love to Karen, Christian, Marie, Sophie and Søren from me, and to you most particularly from
Your
H. C. Ørsted

Regards to Forchhammer from Henry and Dalton and from me. Ø.

Derby, July 21st 1823

Dearest Gitte,
I finished the enclosed letter last night. I shall now use the morning hours before the departure of the diligence or stage-coach, as they call it here, to write a few personal words to you. There cannot be much to tell you since the things I wrote in the letter itself are quite detailed, but it is a great pleasure to say a few words to you alone. I am unspeakably happy about coming home again. No matter how remarkably interesting the journey, I feel an enormous emptiness; and in spite of the instructiveness and the comfort of the journey, I feel the strongest longing for home and companions, especially my female companion. But it may be unseemly to express with full strength all one's longing after one's female companion even if she is one's wife, so I will silence my emotions and press on with my journey. It has been a long time since I have seen your letters be-

cause I could hardly have them sent to me on my so rapidly progressing journey, but I look forward all the more to receiving them in London. It can hardly serve for you to send more letters to London, but on the other hand, I would like you to send one to Amsterdam and write poste restante on it. I shall then ask if there is any letter for me. However, you should not send any important letter to me in this manner, as I have seen cases where they were thrown away; it will be enough if I receive only a few words from you that you are well etc. You have presumably already received the large box with books that I sent from Edinburgh. Confirm this in your next letter. I hope to amuse the children, and you, too, with the large encyclopædia that I received, which is filled with instructive pictures.

I see that time will not permit a much longer letter; be satisfied with this as it is. I embrace you in my thoughts.
Your
H. C. Ørsted.

Warwick, July 25th 1823

Dearest Gitte,
It is only a few days since I sent you a letter from Derby. However, I cannot deny myself the pleasure of writing a little more to you today as I have a few moments of peace. I told you last that I had been in Manchester. I mentioned the most remarkable things that I had seen there, but I did not mention the unpleasant sides of this city. It may not be without interest to hear something about them. The extensive manufacturing that is dominant here results in a large class of workers who, for the most part, are very coarse and very poor. As soon as the working hours, which admittedly are many, are over, they fill the streets. However, they are tolerable when they have work enough, but when circumstances arise where they do not have employment, they are terrible. Even now that there is plenty of work, there is much disorderliness or crime. Thus I recently heard the story of a frightening murder committed by three such workers on a factory owner. In Birmingham, where I have been recently, the workers seem to be better and in better condition. They were unemployed immediately after the peace and suffered great deprivation,

but at that time the state paid 70,000 pounds sterling, that is about 800,000 Rbd, each year for their support. But they did not receive this support for nothing. They had to perform various tasks, which may not have been profitable, but which did keep them occupied. The improvement of the school system has made an important contribution to the elevation of the workers. During the last 15 years, they have had schools run according to the Bell-Lancaster system[58]. You know that one can educate a great many in a short time with this system. This is important in the factory areas. It has been found that no crimes and few offences had been committed by those who have been so educated; therefore, good education has borne the finest fruits. – The humidity this year is remarkable. I have seen only very few dry days on my journey from London and hardly any warm ones. The part of England where I have been recently is among the wettest. Manchester is compared to a pot into which the English heaven pours all its excess fluid. I shall not repeat what the place is called on account of this, it is enough to say that it is truly a rainy city. – On my journey from Manchester to Derby I passed through Matlock, whose environs are considered among the most beautiful in England. Although the weather was most unfavourable, I was very glad to see this beautiful spot in the country. As far as I remember, I told you in my last letter about heating houses with hot air. In Birmingham I have experienced that they have heated and continue to heat a hospital in this way to great advantage. They save fuel, provide a healthier heat, freshen the air, and rarely or never experience fires. In summer they can even introduce cool air to the great benefit of many kinds of patients. – I have already told you much of what I have heard and seen in Birmingham without having told you anything about my stay in this place. I came to Birmingham on the 21st, and in the evening I delivered letters of introduction to Peyton, Yates, Badams, and Watt. I had letters to the first two from Parkes, to Badams from Brewster, to Watt from Davy. The next morning I went to luncheon with Yates, who then accompanied me to some

58. Named after Dr. Andrew Bell (1753-1832) and Joseph Lancaster (1778-1838), who independently developed a system based on the abler pupils being used as 'helpers' to the teacher, passing on information they had learned to other students.

factories. I saw a whip factory that was remarkable enough for the simple and precise manner of fabrication. Far more remarkable, however, was Tomasson's factory for ornamental ware, I do not know a better name for them. One first enters a magnificent boutique or storehouse, consisting of several large rooms. One finds the most beautiful silver plate, figures in planished metal, bronze copies of antiquities etc. In a room of its own can be seen a bronze copy of the famous Warwick Vase[59], about which more later. In a separate room in the factory itself, I saw an artist who had just made a bust of the King of England, which was now to be cast in bronze. Here in England such a factory is often the place where artists get their first training. As a boy, the famous Flaxman wandered the streets of Birmingham, crying buy my pictures. The elder Boulton noticed his plaster pictures and took him into his factory as a modeller. He later went from there to London, where he developed his talents more fully. We saw plating in another part of the factory. I say "we", for I must note that at this place in the factory I met four beautiful young ladies, who pleased me greatly with their modesty of dress and behaviour. They were also very well informed. I later learned that they were Quakers or Quakeresses, two of them daughters of the same Howard who first taught us to name the various clouds in an appropriate manner, and to whom Goethe has therefore written a poem of praise[60]. In another part of the factory we saw button making; in yet another the fabrication of knives etc. – Badams later took me to a factory for brass-ware, where I was delighted to see the great ease with which a large part of the planished brass rosettes and fittings are made, which we often have to pay a great deal for. I have seen this kind of work before but not on such a large scale. I dined with Badams, who showed me several remarkable things of his own invention.

On the 23rd Badams took me to a limestone quarry and a lime kiln at Dudley. On the way, we visited by invitation a clergyman

59. The Warwick Vase is an ancient Roman marble vase with Bacchic ornament, discovered at Hadrian's Villa at Tivoli ca. 1771 by Gavin Hamilton (1723-98).

60. *Howards Gedächtniss*, published in German and English in Gold's London Magazine (1821).

Correy, a man of great learning and reputation. We had our luncheon with him and saw his library. Badams also took me to an ironworks a couple of Danish miles from Birmingham. There I saw all operations with iron, but unfortunately not as carefully as I would have liked partly because we had to rush, and partly because we had the most terrible rain. I ate dinner with James Watt, from whom we bought our steam-ship. B[o]ulton was there. The present B[o]ulton and Watt are sons of two famous fathers, who founded the factories that these two now own. Watt is very reserved, lives only for his factory, and is not even married. B[o]ulton, on the other hand, is married, has acquired a large country estate for about a couple of millions in our currency, and lives grandly. However, Watt has acquired a magnificent manor house, Aston House, which he has preserved in its original style.

On the 24th I went to luncheon with one James, banker. He took me to a glass-works and glass-grinding works, which I found very interesting. He also got me more information about heating rooms with air. Today I dine at Bulton's, where I received much information from Watt about steam-engines that consume their own smoke.

On the 25th James took me to Warwick, which is on the road to Oxford. He showed me the castle there, which is one of the most remarkable memorials from times past. It is preserved precisely as in the Middle Ages. Immediately in the entrance, which is a very large hall, one sees an enormous fireplace, in which are piled mighty logs and not, as now in England, coal. Tapestries, chairs, tables, cupboards, all in the oldest style we know. Wonderful paintings decorate the walls, mostly portraits painted by famous masters. We were shown around by a kind of chambermaid who told us the names of the masters with great skill, but as she sometimes ascribed to the painters works that did not fit the period, one was forced to trust one's own eyes. In some cases it was easy to identify the master; as regards others it was evident that they were by good masters, and that is also the general opinion. The garden is also magnificent; among other things, it contains a great many cedars. The castle and the surroundings contribute to the embellishment of the garden by offering remarkable views. A river flows through it. We had a beautiful view from the castle tower. What previously served to discover

an approaching foe now serves to contemplate a rich and peaceful nature. – From here he took me to Leamington, a watering place ½ Danish mile from Warwick. A few years ago, this place was a miserable village, now it has beautiful large houses, restaurants, public gardens, libraries etc. The old village looks quite poor beside the new elegance, which owes its existence to a laxative salt that is in the water. James told me that a man, who had a piece of land near the village and got 70 pounds a year from it, some years later got 2000 pounds a year by leasing the land to people who wanted to build there. – I must return once more to Warwick Castle. A Duke of Warwick often appears in Schakespeare, with his power he deposed and installed several kings of England and was therefore called the King-maker[61]. Legend gives the Warwick family a long life; for Guy of Warwick was a member of King Arthur's Round Table. They show his walking stick, his pot, his spoon etc. all in the same supernatural size as everything that is attributed to our **Ogier the Dane**.

On the 26th I continued on my way to Oxford and passed through Stratford, where Shakespeare was born. I saw the house in which he was born. The room in which he was born is still preserved unchanged. The house is now wretched, and the ground floor is a butcher's shop, but the room in which Shakespeare was born is undisturbed, as I said. It looks poor, but the walls are decorated with countless names and inscriptions that show the great enthusiasm for making pilgrimages to this place. It is, indeed, gratifying and must be particularly inspiring for every fiery youth to see how a man, independent of birth, even of education, can elevate himself to the highest honours that a man can achieve. – As is reasonable, a street in Stratford is named after the poet. – I came to Oxford early enough to have dinner and then to pay visits: I met Buckland, who asks to be remembered to Forchhammer. He was about to go to the country but spent some hours with me in the evening. Through Buckland I became acquainted with one Miller, a German who has now lived in England for 22 years and has his residence in Bristol. He has written an excellent book on en-

61. Richard Neville (1428-71), Earl of Warwick.

crinites[62], which I hope will please Forchhammer and Reinhard if I can bring it with me.

I spent the 27th and 28th in Oxford. I saw the museum, which is currently being renovated. I also saw the Radclief Library, founded with a private citizen's means. The same Doctor Radclief has given the means to build a hospital and an observatory, both of which are important buildings. The botanist, Dr. Wilson, is the librarian at the Radcl. Lib. The astronomer is completely disabled. Almost everyone was out of town on holiday. However, I must note that I met a Dr. [Bow] and got from him some books for Bishop M[ü]nter which he had not yet received. It might please the Bishop to know that I have performed his commission. – Oxford is remarkable for its many Gothic buildings, mostly colleges, of which there are 19 here. Even more recent buildings are built in the Gothic style. However, the Radclief Library is in the Greek.

On the 29th I left Oxford and arrived in London on the same day before 3 o'clock, after having travelled 13 Danish miles in 7 hours, which is not the highest speed in England.

I shall leave London in a few days and presumably take the shortest route via Aachen. I shall not go to Holland, then. It would pain me if you had sent a letter for me to Amsterdam. As I want to hurry, I cannot suggest anything other than your sending me a letter to Hamburg, poste restante. I cannot expect to receive more on this journey.

I shall be unspeakably happy to come home. All that I have seen and learned has awakened new wishes in me to benefit the land of my birth. Every pleasure I have enjoyed, I shall enjoy again in double measure by remembering it with you and my loved ones at home.

Be well. I shall hardly have time to write to you more often from London. Remember me to Dr. Forchhammer and give him my apologies for not writing to him myself. However, I have not forgotten his commissions. It is clear that I shall not come home until 1 week after the end of the holidays. If Dr. Forchhammer sees that there is

62. *A Natural History of the Crinoidea or Lily-shaped Animals, with Observations on the Genera Asteria, Euryale, Comatula and Marsupites* (1821).

not too much left, I think it is unnecessary for him to begin again for that short time. If, on the other hand, he thinks that what remains is too extensive for 5 to 6 weeks, I ask him to use the time as he thinks best.

Regards to all good friends and especially Anders and Mathilde, Mother and Bodil, your sisters and their children. Congratulate your sister Lind and her husband on the addition to the family. Love to Karen, Christian, Marie, Sophie, Søren, and especially to you, my Gitte, from
Your
H. C. Ørsted.

London, August 8th 1823

Dearest Gitte,
You will still receive this letter from London. I have been kept indoors for several days now with an indisposition like the one that kept me in bed for some weeks when we lived in Dronningens Tvergade. However, this case is not as severe and is improving so that I have decided to depart from here on August 13th with the steamship to Calais, or in the event that I should not be able to endure driving, then to travel with a large merchant ship that is almost ready to sail to Elsinore. It is possible for me to get both Bindesböll and the carriage over here. It is likely, however, that I shall travel by land. In that case, I shall arrive around the 23rd or 24th in Hamburg and travel by steam-ship to Copenhagen on the 28th. If I travel by this route, you shall receive a new letter from me in 1 week or 10 days, if I travel by sea, you shall receive another one here from London, probably 3 or 4 days later than this. In any event, I shall ask Doctor Forchhammer to begin for me after the holidays, in return for which I shall come and liberate him as soon as possible. I do not have much news to tell you as I have been confined to my room for most of the time. However, I first spent a day with Count Moltke at Richmond, which is regarded as one of the most beautiful regions in England. Count Moltke had also invited Councillor of State Schirach. The region is not only beautiful, but it also calls forth remarkable memories. Thomson wrote a portion of his *Seasons* there, and **Pope** had his country house there. They still show the grotto

where he often sat working. We took a tour on the Thames between buildings and gardens that rise like amphitheaters. From a high terrace in Richmond, one overlooks a very beautiful area. The tyrant, Henry the 8th, lived in Richmond, and one can still see the tree from which he awaited the signal that his wife Anna Bolein had been executed so that he could immediately marry the next one. It was horrible to imagine this deed in the full extent of its corruption, not merely that of the King but also of his henchmen. The beautiful memories of the place are as if infected with this hideous one. – I am almost disconsolate at still lying here. I long so deeply for you, for home and all that belongs to it. A busy but, I also hope, a happy time awaits me at home. However, I hope that my work will not leave me less time for you and the children and my friends than before, for I intend to rid myself of useless or less important work as much as possible.

Regards to all good friends and especially my brother and Mathilde, Mother and Bodil, your sisters and their children; love to Karen, Christian, Marie, Sophie and Søren. Tell them that Father misses them very much. Above all, love to you, my Gitte.
Your
H. C. Ørsted

Calais, August 14th 1823

Dearest Gitte,
I have now finally crossed the sea again and sit here on my birthday waiting for Bindesböll to come from Paris, which is admittedly only a 30-hour journey from here; but that can seem very long to me in this boring town, inhabited solely by swindlers who mostly live by cheating rich Englishmen, but who do not despise other respectable people's money either. Today one of their bankers has cheated me out of a few *species* in such a wretched manner that I should think most hucksters in Copenhagen would be ashamed. It was a good thing that he could not cheat me out of more.

I cannot deny that it a little hard to sit here in a lonely room on a day when I could be so happy with my family, but as I do not like to be ill-humoured, I shall take up my pen to talk to you, and when I have filled my pages, I shall busy myself with plans for the work

that I shall amuse myself with when I come home. In this way I shall not be completely bored, and if Bindesbøll arrives with the stage coach this evening at 5 o'clock, I shall be in high spirits and drink a toast to everyone who longs for me today, and whom I hope to see in 2 weeks.

There is not much to say about my final days in London as I was confined to my room until I had to make my farewell visits. These were not numerous as almost everyone is now in the country. Davy is fox-hunting in Ireland, Wollaston has followed suit and gone salmon-fishing, Herschell is in Slaugh, where I was to have visited him if this dreadful indisposition had not arisen. I saw Doctor Young, Capt. Kater, Babbage shortly before my departure. Wheatstone, whose interests I have furthered here, came to me every day. Pouillet from Paris visited me often. He is a learned and talented physicist. I am pleased with the friendship, I could say the devotion, that he shows me. Several times before I left, I saw our minister Count Moltke, to whom I should be greatly obliged for the courtesy he has shown me. I also saw our Consul Campbell and his family before my departure. He and his family have shown me much willingness to serve me in any way in which people who know the place and the way things work can serve a foreigner.

On my journey from London to Calais with the steam-boat I had the opportunity to see the tremendous capriciousness of fortune for 13 hours. In the morning before sunrise when we went out, and later until we had come halfway, we had the most beautiful weather so that we had the opportunity to see the beautiful banks of the Thames in an uncommonly clear light. I really wished that I had had you there so that you could enjoy it with your lively sense of such a spectacle of Nature, here further enhanced by the mightiest human activity. I had no acquaintances there; my soul alternated between the scene I had before my eyes and home, from which I wished to bring more spectators. Little by little, common enjoyment set conversations going, and before we had come to the mouth of the Themes, I had made the acquaintance of a very interesting man, who I discovered was a philologist on a journey with his wife. While we amused ourselves very much with our conversation, we felt a sudden shock, and the steam-ship had run aground, strangely

enough on such a clear day and in such a well-navigated sea. If the skipper was disgraced by this, the steam-boat won distinction; for with any other ship we should have sat there for hours, but the steam-boat reversed its engines so that the wheels turned in the direction opposite to the one in which they usually go, and now we sailed backwards from the sand bank. However, we were now among the shallows and struck the ground two or 3 times more. The lady got convulsions from fear even though I consoled her as well as I could, and we had to prepare a bed for her on one of the benches, for which I gave my travelling clothes. It was fortunate that we got off the shallows in time, for the sea began to swell within ½ hour. The wind was not very strong, but the waves were violent and came from the side, which is the least favourable, especially for a steam-boat. I have never been tossed about so much. Almost everyone was sea-sick. I was one of the few who were not. Another lady had convulsions; in short, I have never seen more misery on a sea voyage. The unpleasantness was made worse by a fog, or rather a fine rain, which made it impossible to see more than ¼ mile. When we looked for land, the tops of the distant waves often deceived us with the appearance of distant mountains, but soon after their movement showed us that it was the barren sea, as Homer called it[63]. The waves sprayed us thoroughly so that I had every reason to wish for some of the travelling clothes which the poor lady was lying on, but which it would have been a shame to take away from her. When we were about ½ mile from Calais, the weather changed again as if by magic. The sky turned blue, the sun lit up the coast, the land protected us from the waves, people came out again from their hiding-places, pale and weak to be sure, but cheerful again nevertheless. I had been sitting by the mast, where I had constantly been able to see everything that took place on the sea and on the ship. People were surprised by the sudden change, but I had occasion to observe that we had sailed through a great mass of fog. Before we came to it, I saw it as a great mass of clouds in front of us, after we had passed through it, I saw exactly the same behind us. The wind was from the

63. *Odyssey*, book II, line 370. The literal translation of the adjective used by Ørsted is "grapeless".

west. The mass of fog had been created by a wind-stream, 3 or 4 miles wide, which had carried this miasma with it from the Atlantic Ocean. The heated air above land on both sides seems to have prevented the wind-stream from becoming wider. The beginning and the end of our journey were cheerful. To be sure, several ladies said that they would never go to sea again, but we must always wish and hope that what ladies say immediately after having gone through so much will soon be forgotten, so I wish them good luck for new journeys. We finally came ashore. We were immediately surrounded by inn-keepers and commissionaires for inn-keepers who offer their houses. However, this practice has its value for the traveller if only he already knows the names of the best houses. The landlord of the *Hotel de Bourbon*, where I had left my coach, was there himself along with his commissionaire. The latter accompanied me to the custom-house and took care of paying the porters etc. Whether he will cheat me more than others will soon become apparent.

Brussels, Aug. 17th. Bindesböll did not arrive until the 15th in the evening; it was not his fault but Copmann's, who had failed to give him my letters. We have already made up for some of the lost time by travelling one night. I certainly hope to come to Hamburg on the 24th at the latest and to Kiel on the 27th. On the 29th to Copenhagen by steam-ship. I would already have sent a letter from Calais, but since this had to go to Paris first, it would have arrived later than this.

Regards to all good friends, whom I soon hope to see. Regards to Anders and Mathilde, Mother and Bodil, your sister and children. Love to our own Karen, Christian, Marie, Sophie, Søren. Love to you especially from
Your
H. C. Ørsted

Tell Gjerlev that I have performed his commission. Written in extreme haste in transit.

4.
Journey to Northern Germany (May 1827)

To Inger Birgitte Ørsted:

Altona, May 11th 1827[1]

Dearest Gitte,

I hope that you will be satisfied with the speed with which I let you know about my arrival here; I also hope that you will not hesitate either, but that you have already sent me a letter before this one arrives. I ended my last letter by telling you that I visited Repsold last Monday. He showed me his balance, which is really excellent, and there is also a new method for making weights that are not changed by the effects of the atmosphere. As I had already told you beforehand, I dined with Repsold at Schumacher's, where a Mr. May, a Frenchman who had travelled with us, was also present. I spent the next morning again with Repsold, who dismantled his balance in order to make me more familiar with it. While I was there, we received a letter from Schumacher informing us that the famous Humboldt had arrived and was to dine with him. We then had dinner at Schumacher's with H., who has now been appointed to be a kind of scientific minister in Berlin; although without this title. He is to accompany the King of Prussia on a summer journey. The next day we visited the astronomical observatory in Hamburg with Humboldt. It has been built on the ramparts under Repsold's supervision and has a very beautiful view. Schumacher and I had dinner with Repsold along with a Pastor Hübbe, whom I had seen 25 years ago as a candidate; also a Senator Hutwalker, brother or cousin of

1. In May 1827 Ørsted travelled to Germany. It is clear from the start of the letter that this is not the first letter sent, but no previous letters from this journey could be found.

the clergyman and a Dr. Sieveking, brother of the one you know. I spent a large part of yesterday at home in order once more to see Humbold[t], who was to come during the morning. Besides, I had caught a cold, so it was quite convenient for me to remain at home and work. These days, the weather here is very uncomfortable for me as it rains most of the time. In the afternoon at 4 o'clock Schumacher and I drove to a country house in order to dine with a rich old Hamburger by the name of Schuchmacher, along with a Senator Westphal and his son. The latter seems very cultivated; Repsold and Hübbe were also there. On the way home S. and I again took leave of Humbold[t]. Today I have again spent time with Repsold and his measuring instruments. I now intend to spend the rest of the day at home as the rain is pouring down. So once again you have a little journal from me; it is only short, but you can see from it what I am doing. My life here is extremely comfortable; I take my morning tea in my room. Schumacher gets up almost as early as I, but he usually works alone until 10 o'clock in the morning. We are together neither more nor less than is appropriate for people who make use of their time; however, I recognize that I should not neglect to benefit somewhat more from scientific intercourse with him on days when it is suitable. I have so far forgotten to tell you that I have visited Apothecary Zeise and Dr. Schmeisser, that Dyssell is passing through here, that I have received several visits, among others from an Apothecary Struve, who seems to be a nice man. I have not yet been to visit Lehmann due to the bad weather and the long distance, but I have had the opportunity to inform him of my reason through a Dr. Siemers. The weather alone would not have prevented me, but I have had a bad cold for three days; it is a little better today.

I cannot yet calculate precisely how long my business here will take, but I hope to give you more definite information in my next letter. Then I shall also try to give you some useful information that I have tried to obtain concerning the things you may need on your journey; nor will I forget to tell you about the very necessary money for it.

Give my love to the children and tell them that their father thinks of them often. Regards to Miss Begtrup. Tell my brother that the

jurists here ask if he is not going to come. Regards to your sister and her children. Regards to all good friends. Finally, receive my warmest love and embraces from
Your
H. C. Ørsted

Altona, May 22th 1827

Dearest Gitte,
I recently received your letter. I shall reply immediately since the post is about to leave. I am happy to hear that everyone at home, big and small, is doing well. Every letter that I receive from you is a genuine pleasure, so I ask you not to be sparing of them. Although I am comfortable here in every regard, I still long for home more and more every day. Since I last wrote to you, I have made a number of new acquaintances and attended several gatherings. I had dinner one day with a Doctor Siemers, whose brother is at the Botanical Gardens in Copenhagen and is a frequent guest at Lehmanns'. I had dinner another day with Pastor Hübbe, and with the Russian Minister v. Struve yesterday. Today I shall dine with Professor Lehmann and this evening present a review of electromagnetism in the local medical society, which is called *ärtzlicher Verein*. I spend most mornings with Repsold in Hamburg, where we perform experiments with his balance, and where I am becoming familiar with a number of mechanical tricks that are also useful for physics. I shall remain at home today until around midday so that I can attend to some letters and perhaps receive the famous mathematician Gauss, who is expected today.

Your travel plan seems to me to give you rather a short time in Hamburg, although I admit that the time I had suggested could seem long for you in the event of bad weather.

I am sending you three enclosed letters that should get you money for the journey. I ask you to put one of them, the one to Count Knuth, in an envelope and to seal it. The address should be as at the bottom of the letter. The other two require only sealing. You will then receive more than 300 Rbd, which is more than we could expect to spend but hardly too much if we wish to provide against possible embarrassment. There will not be much left of the 250 Rbd

I received. I have got a handsome black suit of clothes, which accounts for 78 Rbd. The custom of giving about 1 Rbd as a tip where one eats also takes a good deal as I am so often invited out. Hiring a carriage here is quite cheap but used frequently. With all this I still have more than 100 Rbd left, but there will also be a number of expenses when I leave Altona. I do not doubt that there will be something left, but I merely think that one should not rely on it. I shall close now as I have to go out. Love to all the children and Miss Begtrup. Give my kind regards to my brother and tell him that I regret that he is going to leave when I arrive. Regards to Winkler, Forchhammer and Reinhardt. Regards to Hall and Hunderup from me and also to Born. Let me not forget to send my regards to your sister and her children as well as to Professor Klingberg; I am sorry that he has to suffer so long from his indisposition. Regards to all good friends to whom you know I would wished to be remembered, but above all I send my love to you, my dear Gitte.
Your
H. C. Ørsted.

Altona, May 29th 1827

Dearest Gitte,
I would write naughty Gitte had I not myself devised excuses for the absence of letters from you. I presume that on the relevant post day you must have been in Roskilde or some other such place where you did not have the opportunity to write, but I beg you urgently to write on the next post day. As comfortable as I am here, I still long more and more for home. It seems like a whole eternity since I spoke with you. A letter is at least a small compensation. If our reunion were not so close, I would say that **Karen** should also write. Since I do not know how soon I may be interrupted, I shall first of all write a few words about the journey. I do not know if I remembered the other day to tell you that it would be best to go to **Roweders** in Kiel; Schumacher and those who are connected with him go there. I shall write or have somebody write to him to look after you and your conveyance. I have chosen a suitable place for our lodgings in Hamburg, but I have not wanted to commit myself to renting it until I have received the last letter before your departure; for if the rooms

should be occupied, we would surely be able to find others. At Roweders in Kiel you will find a letter from me in which I give the address more precisely. I am thinking about moving to the lodgings on the day when I can expect you so that I can receive you in a kind of home. I can promise that both Schumachers and several others will take all possible pains to make your stay pleasant. Above all, I can promise that HCØ will spare nothing to take you around as well as he can. The weather here is still very unstable, but that affords even better grounds for expecting that it will assume a better character before your journey; besides, it is not all that bad.

Lately, I have been almost constantly with Schumacher and Gauss. The company of this great mathematician is much to my liking. – Yesterday, however, I dined out, in Hamburg with Dr. Gerson. Many doctors and friends of natural science were present; most of them were members of Hamburg's **Ärtzlicher Verein**, where I gave a lecture on electromagnetism a little more than 1 week ago. Both here and on several previous occasions, I have been shown a satisfaction with this lecture that far exceeded my expectations. As I soon expect to be called to the dinner table, where there will be guests, I shall close here. I need hardly say that Schumacher and Mrs. Schumacher always ask me to send you their regards and speak of you in the most friendly way; only recently Mrs. Schumacher asked me to send her warmest regards to you. Love to all the children and Miss Begtrup from me. Regards to my brother, to Winkler, Forchhammer, Reinhardt, Hall and Hundrup and the other friends you know I think about. The warmest love to yourself
from Your
H. C. Ørsted

5·
Journey to Berlin (September 1828)[1]

To Inger Birgitte Ørsted:[2]

Greifswalde, September 13th 1828

Dearest Gitte,
After a somewhat difficult journey we arrived here safely an hour ago. The journey to Malmöe was pleasant and lasted only 4 hours. We were somewhat delayed in Malmöe, so that we did not reach Ystad until the next morning, but had to spend the night at an inn which, however, was quite tolerable. We departed from Ystad last night with the steam-boat but had such a strong and violent head-wind that we did not arrive here until this evening. We were 21 hours at sea. Upon our arrival at the inn, which it was not possible to reach until 1 ½ or 2 hours after the steam-ship had delivered the mail to a boat which was then sent off, we had a visit from a General Consul Lundblad, who invited us to an evening party to which we shall now go rather than go to bed. At 4 o'clock in the morning we shall continue to Berlin. This is briefly what I can write to you at this moment in order to prevent any possible unease about the storms that we have had in recent days. A thousand regards to you all.
Your
H. C. Ørsted.

1. In September 1828 Ørsted (and other Danish and foreign natural scientists) participated in a conference in Berlin, arranged by the *Gesellschaft Deutscher Naturforscher und Ärtze*.

2. All letters from this journey were sent to Ørsted's wife Inger Birgitte, called Gitte.

Berlin, September 16th 1828

Dearest Gitte,

I finally arrived here yesterday evening towards 10 o'clock and was received in the most friendly manner by Weiss and his wife. On the 14th we left Greifswalde at 5 o'clock in the morning and arrived at 10 o'clock in the evening at Alt Streilitz, where we spent the night. The next morning we left this place already at 4 o'clock and, as I just said, reached Berlin in the evening. The distance is 26 Prussian post miles, which, however, is not much more than 20 real miles, but the road is extremely sandy so that one does not cover more than one post mile per hour. There are not many amusing incidents on such a journey. The only one I can think of mentioning occurred at Treptow, a small town where they change horses. While we were having some lunch, a man came up to us and introduced himself as a Doctor Meier and asked for Professor Bornemann, who we immediately guessed was Hornemann. He said that he wished to make the acquaintance of this scholar, but it soon became apparent that he only knew of him because the post-horses had been ordered in his name, which, however, he had read as Bornemann instead of Hornemann. Nor did he seek to learn anything from him but confined himself to telling us that he was the district doctor, that he missed intercourse with scholars, that he would prefer to be a professor, that he hoped not to die in this place. After having said this, he took his leave, saying that he was pleased to have made the acquaintance of Professor Bornemann. We regarded this as a little play performed for us in order to reduce the boredom of the journey. When the sandy road was quite even and deep, we whiled away the time in another way by holding several philosophical conversations which were conducted with a calm and an order that are not often attained at parties. The entrance to Berlin is very desolate and sad from the side from which we came. Even ¼ mile from Berlin one finds deep and broad sand roads and very few buildings. How unfavourably does this not differ from the friendly, fertile and richly built surroundings of Copenhagen.

This morning I gave Mrs. Weiss our present, which was a great success, so that I am quite pleased with our choice, or rather yours.

I have spent the greater part of the day making new acquaintances and renewing old ones. At 10 o'clock Weiss took me to the conference hall, where the recently arrived naturalists were registered. One then receives an admission card, on the back of which is a sketch of the conference hall with the rows of benches and their numbers indicated with Roman numerals, places on the benches are indicated with the usual numerals, and the place which the recipient of the card is to have is indicated with red ink. My seat is No. 5 on the first bench. The meetings do not begin until the day after tomorrow. Lichtenstein, the secretary of the conference, was in the conference hall where people were registered, and Humbold[t] arrived later. As I was standing near the door, Lichtenstein came over to me and said, "Go farther in, people will gather around you." – Among the many more or less famous men that I met here and later at the dinner table, I want to mention Ocken, Linck (who has also been with us in Copenhagen), Steffens, +Wöhler, +Gustav Rose, Keilhau (from Norway), Hofmann (mineralogist from Halle), Steininger, Nöggerath, +Retzius, Walmstæd, +Böie from Holstein, Legal Councillor Wiedemann from Kiel, Prof. Lehmann from Hamburg, Rudolphi, Seebeck, Dirichleth, Fischer from Breslaw, Purkinje, Rudolph Brandis, Burdach, Nielson from Lund, Friis a Swede, Erman, etc. I see that my list of names would be far too long; I shall only say about those mentioned here that I have put a cross next to some who have visited us, but whom you might not remember immediately. We ate dinner together, quite good at a reasonable price. This gathering was not held in the same place where it will be held from the day after tomorrow. Then the meetings of the Society will begin, and the drill hall will be converted into a dining hall. Two days after the first ordinary meeting, after dinner, Humboldt will hold a soirée, which the King of Prussia will attend.

Next year's meeting was to have been held in Vienna, but this idea has now been abandoned. Metternich fears these meetings. The Kaiser[3] had granted travel money to attend the Berlin meeting to two Viennese naturalists, but when they tried to obtain passports from the Minister of Police, he told them that they had better stay

3. Franz I of Austria (1768-1835).

at home and decline the travel money. In short, the Kaiser allowed but Metternich forbade the journey.

I am arriving home at this moment and must hasten to close due to the departure of the post. Give my love to the children and to my brother and to all who are dear to us.

Special love to you from your
H. C. Ørsted.

My address is:
An den Hrn Professor Ørsted aus Kopenhagen
abzugeben an den Hr Professor Weiss
in dem Univs. Gebäude in Berlin.

Berlin, September 19th 1828

Dearest Gitte,

I must hasten to write down some of the many things I have seen and heard so that I shall not forget too much of it. Thus you will receive a kind of diary which will contain several things that will not be of interest to you; I cannot find the time to keep two diaries, so you must be content with getting more than you really care for, but you shall be spared scientific expositions, for what I need to write down about this, I shall do separately. – After I had finished my letter the day before yesterday, I went with Weiss and Mrs. Weiss to a concert where they performed Händel's *Alexander's Feast*[4]. The name is not quite accurate. The poem to which the music has been composed is really written for the holy Cecilia's feast, but the poet has first described in great detail how the Greek musician Timotheus cast Alexander into the most varied passions, pride, intoxication, sadness, love, vengefulness; and then he says that all the old music must make way for Cecilia's invention: the organ. The author of the poem is, as we know, **Dryden**, but **Ramler** has translated the English text into German. The concert hall is beautiful. The concert was performed by amateurs with the help of some actors under the di-

4. Choral work (1736) by George Friedrich Handel (1685-1759) with a libretto by Newburgh Hamilton (1691-1761) after *Alexander's Feast, or the Power of Music* (1697), an ode by John Dryden.

rection of **Zelter**, who, for more than 30 years, has been known for the zeal and the success with which he has promoted singing in Berlin. Humboldt had requested me to give a lecture the next day at the meeting of the naturalists. I had intended to consider what I would say during the concert as I have done before, but this music and song held my attention captive from the beginning to the end.

Here I was interrupted on the 19th in order to go to a meeting of the Society; today, the 21st, I shall continue. The first public meeting began at 10 o'clock on the 18th. It was held in the same concert hall where *Alexander's Feast* was performed. Humboldt opened the meeting with a speech in which he described the pleasure of seeing so many men of science come together from the farthest regions. He also mentioned the fact that so many Scandinavians had come so that one could see that this event had also expanded to include the entire Scandinavian race. In this connection he mentioned both Berzelius and me, not by name but by designating us by our discoveries. I was requested to give a lecture immediately after Humboldt. At Humboldt's request I had chosen a new development in the fundamental theory of electromagnetism. The lecture was extemporaneous, without notes, but I cannot say that I satisfied myself; however, so many of those present have expressed their satisfaction, on several occasions and without prompting, that I must believe that I have been more fortunate than I imagined. – On the same day a Professor Pusch read a paper on the geography of Poland, whose contents experts found to be excellent but the delivery poor. A Prof. Münchou from Bonn read a paper on coloured shadows, which he delivered so histrionically that one did not understand the contents and did not like the delivery. Finally, a Dr. Henschel read a very long paper on the fertilisation of plants and created general dissatisfaction both with the length of the paper and with the unreliability of the contents. You will see in the continuation of this letter that the following meetings were more profitable. After the meeting, dinner was eaten in the newly built drill hall, where probably more than 400 people ate together. – However, I find that this arrangement of eating together in one place is not so good as one might think. It is difficult to enjoy any conversation when almost everyone, and that so many, speaks at the same time. If things had been arranged so

that no more than 10 or 12 ate at one table, with only a few tables in each room, it would have been much more sociable. Otherwise, the tone is of the best, and the food and drink good and inexpensive. – In the evening the entire Society was invited by Humboldt to a soirée in the hall of the playhouse, which is very beautiful. Not only the naturalists from the Society but many of the finest men in the city had been invited; there were also 3 young people from each grammar school, chosen by the teachers. The pages of the King of Bavaria, who happened to be in Berlin, also received admission cards. The King[5] and the Royal Family were in some loges and in a gallery. The hall had been redecorated in honour of the occasion. One end was decorated with tablets on which the names of Germany's finest deceased naturalists were written in gilt letters. The most famous names were in the middle in large letters. One saw there **Conrad Gesner, Kepler, Copernicus, Leibnitz, Euler, Haller, Kant, Hershell, Pallas, Werner**. It would be too much to mention the other names. At the sides were a verse by Schiller and one by Goethe. Several songs were sung very beautifully, though at great intervals in order to make time for conversation. I was encouraged to go up to the gallery, where I found the Crown Prince[6] and other princes. The Crown Prince spoke with **Berzelius**, with **Gauss**, with **Reinwardt**, an excellent Dutch naturalist who has made an important journey to the East Indian islands, and with me. The Crown Prince told me that it had not been necessary for me to apologise during the meeting, at which he had been present, for my talk, which it pleased him to praise. Otherwise, he spoke to me about steam-ships and the speed with which we travel in our time.

There was another meeting on Friday the 19th. Before I describe its contents, I must tell you that during the meetings I sit beside v. Kamtz, who is Minister of Police and known by name to my brother and other good people. He said many complimentary things to me about my brother. He told me that if my brother were to attend their local law commission, he would hear his name daily. He praised my brother's works in the strongest terms, especially his critique of Ba-

5. Friedrich Wilhelm III (1770-1840), King of Prussia 1797-1840.
6. Friedrich Wilhelm IV (1795-1861), King of Prussia 1840-61.

varian legislation, and said, among other things, that one could turn to it as to a catechism. Minister Bäume spoke in similar tones and treats me, I almost think because of this, with the most courteous friendship. Several jurists here and on my journey have spoken to me about my brother and given him the warmest praise. At the meeting in question, a Dr. Schulz from Freiburg lectured about the cutting out of the spleen from humans and animals and thought that this could really be a remedy for hypochondria. Berzelius lectured about Siberian platina, W. Weber about a new kind of organ pipe where one can increase the sound without making it higher or lower. His lecture was among the most interesting, and his invention promises to be of importance for music. A Dr. Göppert read a paper on the effect of poisons on plants. In the evening, Weiss had a little party at his home, where Hornemann, Forchhammer and Bredsdorff were also present.

On the 20th there was another meeting. Among several, Ocken lectured about the number of vertebrae in the human spine. His delivery met with general approval, but not his opinions. A Privy Medical Councillor Wendt from Breslau read a mediocre paper about stones in the human body. He had removed stones from the tongue, from the lungs, from the joints etc. Lampadius gave a lecture on the medicinal effect of sulphurated carbon; **Froriep** on a three-fold misformed fœtus; Prof. Hofmann from Halle on the geognosy of northern Germany. Finally, a superintendent read a ridiculous little paper about life on earth and all the planets. He regarded the earth as an animal that breathes etc. and displayed much ignorance by the manner in which he tried to prove his opinion. There was a chemico-physical meeting in the afternoon. They have decided upon an arrangement such that there are small meetings for the practitioners of each individual science in addition to the large meetings. One discusses or presents scientifically interesting points. I had a long argument about the fundamental theory of electromagnetism. Prof. Münchou from Bonn and a Prof. August from Berlin were those who raised objections. The argument was conducted very amicably and ended without bad feelings. In the evening there was a large party at v. Buch's. He has given me a bronze copy of a medal that has been struck of Humboldt.

Today, the 21st, we have had a physical meeting, in which the above-mentioned Weber showed his experiments in more detail and explained many related phenomena. I presided in the meeting. It has been agreed that I shall preside in the physical meetings, Berzelius in the chemical ones[7], Hornemann presides in the botanical meetings. Concerning the other sections, I do not yet know exactly who presides; I cannot attend all of them. This morning I paid a visit to Count Bernstorf, who was in bed because of gout, but who received me nevertheless. I ate dinner with the Interior Minister, v. Schuchmann, where Berzelius, Reinward and I were invited. In the evening I was invited to a Privy Medical Councillor Rust, but I declined because Weiss was not also invited and was happy to be able to spend another quiet evening with Weiss and Mrs. Weiss.

Berlin, September 26th 1828

Dearest Gitte,

Today you will receive 2 letters at the same time as it was not possible for me to have the enclosed letter sent on the last post day even though it was finished except for the last few lines. I can see that I shall have to express myself very briefly if I am to be more or less finished. I shall not speak any more about the public meetings, except to say that they continued Monday, Tuesday, Wednesday each morning from 10 to 12 o'clock. Their contents can be seen in the newspapers. We have held meetings in the physical section a couple of times. Nothing of particular importance has happened there. On Monday evening (the 22nd) I attended a party, first at Lichtenstein's and later in a club which Lessing has founded, and where my old friend Karsten took me and Weiss. It was very jolly there.

On Tuesday the 23rd I saw the Berlin armoury. Among other things, the tasteful arrangement of the rifles was remarkable. They were displayed so that they formed long regular walls, if I dare call it that, in many places also columns and other forms. They had also

7. Added in the margin: Berzelius did not want to preside because of his lack of accomplishment in the German language. Hermbstädt has presided twice but created confusion so that that section was dissolved.

built entire columns of rifle barrels, whose seams were hidden by brass festoons. From there I went to see the Solly Collection[8], which was shown by a Dr. Wagen. It is a very valuable collection, which has been bought by the King of Prussia. It contains, among other things, valuable pieces by the brothers v. Eyck. These inventors of oil painting immediately attained a great perfection, and the colours in their paintings still retain their initial vitality. Wagen knew a great deal about the methods that allowed these old paintings to maintain the brilliance of their colours and the poorer methods of the painters of the following two centuries which have caused their works to become so dark with time. To describe the great treasure of magnificent paintings that was here would exceed both my time and my powers. At dinner in our large dining hall, there was a **Liedertafel**, whereby is understood a group of excellent singers, under Zelter's direction, performing songs with great purity and harmony. One cannot imagine more beautiful male singing. I shall bring with me the songs that they sang. I can only keep the singing in my memory, and that only as a weak echo. Unfortunately, I had accepted an invitation to Privy Medical Councillor Horn before learning that they were to have a Liedertafel, so I first had to participate in the earlier meal in the large gathering and then sit down to dinner with Horn; however, I was careful not to have too much to eat. In the evening I visited Heinrich Rose. Wednesday the usual business. At dinner they drank a toast to Berzelius, then to me, after that one toast to Reinwardt and Hornemann together, and one toast to Gauss. I mention this to you because I know that it pleases you that such a large gathering shows me such honour. Berzelius, Gauss and I are everywhere treated with the most excellent courtesy. In the evening there was a large party at Weiss'.

On Thursday morning I visited a Mr. Schneider, who showed us some beautiful magnetic experiments. Later all the Danes and Swedes together paid a visit to Humboldt and Lichtenstein in order to thank them for the courtesy they had shown us during the course of this now-finished meeting. We chose Hornemann, as the oldest of us, to be our spokesman.

8. This collection, which belonged to the English banker and art collector Edward Solly (1776-1848), was located in the *Gemäldegalerie*, Berlin.

I was later in a gathering of physicists at Prof. August's and lectured to them about my recent experiments on the compressibility of water. In the evening I was in the Geographical Society and later with Gustav Rose.

On Friday I saw the remarkable Egyptian museum; was later in a chemical meeting at Wöhler's, dined with the Hannoverian Minister v. Rehten, and was at an evening party with Councillor of State Alberti.

On Saturday I first spent a few morning hours with a Professor Posch, who is making my portrait in wax for a medal, on which I shall have the honour of appearing. Later I was present at an examination at the Royal **Gewerbschule**, which is similar to a polytechnic school. There was a dinner party at Weiss', in the evening we were at Mitscherlich's.

Here you have a truly dry and short report of my activities in recent days, but short as it is, I scarcely have time to write it. Tomorrow and the day after are the last two days here. We then travel home via Hamburg. It is our intention to spend only 1 day in Hamburg and then to travel home by land. We could possibly be home on October 9th, but it is also possible that the journey will be a day or two longer. Be well and give my regards to all the children, my brother, Miss Begtrup and all our friends.
Your
H. C. Ørsted.

I am feeling very well here and withstand all the dinners and evening parties quite well, but I also go to such lengths in my cautiousness that I drink water with my meals without, of course, completely neglecting the wine.

[Added in the margin:] Do not forget to give my regards to your sisters and their children, Winkler, Klingenberg, Miss Rogert and Miss Bohn. I am sure that I forget many, whom you will remember for me.
Turn the page.

I finished my letter last night at 12 o'clock, but I am fortunate in having awakened again at 6 o'clock and now have some moments to write some more words to you. When I say some moments, it is not

very exaggerated, for I have to be dressed by 7 as Posch is coming once more to complete my portrait. I have to leave at 8 ½ to see Pistor's workshop, at 10 I am to see experiments at Pohl's, at 12 I am to see the new museum, at 1 I am to drive out to Minister Beume's country house and eat there. This evening I have to be with Medical Councillor Staberoth. However, in all this whirl of parties, you must not believe that time passes unused here. Everywhere one meets naturalists from one's own field, with whom one forms groups and discusses many questions. I would like to tell you much of what happens here if my time were not so busy. In the midst of all this bustle, however, I can tell you that I often think of you and the children with heartfelt longing. Soon I can hope to embrace you again.
Your
HCØ

Altona, October 3rd 1828

Dearest Gitte,
You can see from the heading that I am now on my way home. I must describe the last two days in Berlin very briefly. Before 9 o'clock on Sunday morning, I was with Privy Councillor Pistor, who has an excellent workshop with physical instruments, and who is in partnership with the Mr. Schiek who visited us in Copenhagen a few years ago. From there I went to Professor Pohl, who showed some electromagnetic experiments that were distinguished by their neatness. Steffens and several others were there. I came home at 12 o'clock and was to have visited the newly built museum, but I found myself so tired that I abandoned this. Soon after 1 o'clock Weiss, Karsten, v. Buch and I drove out to Minister Beume, who had a very large party, partly of foreign scholars and partly of this country's important men. In the evening, I was invited to Staberoth, who was once with us in Copenhagen. I went there but did not stay to eat but excused myself because of my cold. You see that I continue to send you my daily, almost my hourly, journal, but it seems to me that there is scarcely any more convenient way of showing how tossed about one is during these busy days. – Already by 7 o'clock the next morning I was with Berzelius, who showed us some of his procedures in the most familiar chemical operations, for which he has

found many small facilitations. Afterwards, Mitscherlich, with whom he is staying, showed some of his experiments on light. I then took a carriage and drove around in order to complete all my errands. I saw a factory that Modeweg had asked me to visit; I went to some instrument makers, paid farewell visits and finally ate with Hermbstädt, who had a large and long dinner. In the evening I was to have been alone with Weiss and Mrs. Weiss, but they had so many visitors that there was nothing left of solitude.

Tuesday morning (Sept. 30th) we left Berlin and the first evening, after a boring drive in deep sand, arrived at Kyritz, a small place that has suffered greatly from fires; two days before, 28 barns with grain had burned, and even at our arrival at 11 o'clock in the evening, the air was illuminated by fire in the ground. The barns are outside the towns here so that their fire does not touch the dwelling houses. The next day we departed at 4 o'clock in the morning and arrived at Boizenburg at 1 at night. This day we had covered 20 miles, of which 10 were highway, the others deep sandy roads. We came to Altona on Thursday evening at 7 o'clock. Schumacher had received a visit from Capt. Sabine and his wife and therefore did not have room for Hornemann and me. He would certainly have made arrangements for us, but we did not want to accept an offer which would give him so much inconvenience. Today we are to dine with him along with Capt. Sabine and Capt. Franklin. They have both become famous for their journeys to the polar region and the polar sea.

It was our plan to leave here tomorrow and to travel by land. At a reasonable estimate, we could then be in Copenhagen on the 9th. It has now been suggested that we should rather travel with the Lübeck steam-ship so that we could be in Copenhagen on the 8th. However, I think that we shall stick to the old decision[9]. I must end now to give this letter to the post.

Regards to my brother and his household, Miss Begtrup, all the children and all our friends.

Your

H. C. Ørsted.

9. Added in the margin: It will be by road.

6.
Journey to Stockholm (July 1842)[1]

To Inger Birgitte Ørsted:[2]

Stockholm, July 10th 1842

Dear Gitte,

We have now arrived here after a very successful journey which only lasted 48 hours. As you already know, the weather on Friday was quite tolerable, but on the following two days we had a calm in the air that almost forced the sailing-ships to lie completely still, but which was particularly pleasant for us. Yesterday evening we had a glorious sunset such as one rarely sees. The surface of the Baltic was almost like a mirror, and the image of the setting sun was shown in the sea so that one almost believed to see the entire sun when half of it had already set, only it seemed to be darkened by clouds in the middle; but when one looked more closely, one noticed that one saw half of the sun and its image, separated by a thin layer of misty air near the earth. The colours of the evening sky were magnificently reflected by the sea, which only had waves created by the steamship, some of which almost looked like large folds in drapery. We entered the skerries near Stockholm before sunrise this morning. I was up at 4, but I still missed the sunrise. On the other hand, I had a glorious view of the many islands which make these waters so difficult that it is necessary to have a pilot familiar with the place all the way. The water today was so mirror-like that all objects were reflected. The part of the image that was closest to the surface of the water looked as if it were lying on top of the water so that the real objects

1. In the period July 13-19, 1842 Ørsted participated in the third Scandinavian meeting of natural scientists in Stockholm.

2. All letters from this journey were sent to Ørsted's wife Inger Birgitte, called Gitte.

seemed to have their outer edges above the surface of the water. The islands themselves are partly barren and almost uninhabited. They consist of granite cliffs, like the coast at the entrance to Gothenburg, but they are not as bare, almost all somewhat covered, and they are so close to one another and scattered so that they form beautiful groupings. *Kammerherre* Bille said that they resemble the groups of islands in the Archipelago. At the lovely sunset yesterday evening and at this sight today I thought about you. How much did I not wish that you had been with me. It could easily happen that one could travel the same route 10 or 20 times without conditions being so favourable.

Space was very limited. My cabin was more or less the size of an alcove, but Christian[3] had a bed on the floor next to mine. There was a washstand in the cabin and, fastened to the wall, a table flap that we could raise. The bed was hard, but I slept very well on it. This morning at breakfast I proposed a toast to the King and Schouw one to the Captain.

As soon as we had cast anchor a very short distance from land, a customs official, undoubtedly the finest customs inspector, came and informed us that our belongings would pass free of all inspection at the order of the government. The superintendent of police also came in order to see that everything was in order. Professor Anders Retzius, the brother of the one who was in Copenhagen recently, came to welcome us. He told me immediately that I was invited to a dinner with Berzelius. Scarcely had I arrived at my lodgings in the Mint, quite near the castle, before Baron Wrede and the other Prof. Retzius came to me. He invited Christian to Berzelius as well. We had to arrange to get our things from the ship as quickly as possible and to get dressed in time. The Mint, where we are staying, is very close to the castle, which is large and lies a little higher than the surroundings, which makes it look impressive. There is, however, no place from which one can see it all. Our route to Berzelius took us past the castle and through a well-built part of the city. The largest part of our route was by a long street, as long as Store Kongensgade, but not nearly as wide. It has no foot-pavement. They do

3. HCØ's son.

not seem to have this convenience in Stockholm. Berzelius lives in the house of the Royal Society, which is a veritable palace. The party was small and purely informal, not an invited ceremonial affair. Forchhammer and his wife were there, Scharling, the former Swedish ambassador to Copenhagen Hochschildt, an ancient former diplomat Brinckmann, whom I saw many years ago in Dresden, Zeise, Jacobson, Molbech. Mrs. Berzelius is small and her physique resembles that of an immature girl, but although her face is also quite youthful, she is undoubtedly somewhat over 30 years old. After the meal, we walked home quickly, and I wrote the beginning of this letter.

July 11th
Yesterday evening we spent an hour in Berzeliuz' evening circle. Since his rooms are on the same floor as the meeting hall and the museum of the Royal Society, these rooms were opened, and the party spread into them. It is a zoological museum and is very nicely arranged and maintained. Today, in about an hour, I am going to visit our ambassador, Count Moltke. We shall dine with Magnus Retzius (who was in Copenhagen recently).

July 12th
We had a wonderful and sumptuous dinner with Magnus Retzius. I soon learned to make sure that I had a little wine in my glass and a carafe of water near me; otherwise the many toasts would have been entirely too much for me. In the evening we were with Berzelius again but only to wander around in the museum. I shall say nothing of business matters, which consist only of preparations. – Christian has attended both dinners and enjoys himself enormously. He has made several friends, among others the famous botanist from **Rostok**, Prof. Hornschuch, with whom he made a tour of the deer park, which is close to Stockholm.

Today I am dining with the Norwegian minister Due. Christian will not come along but will eat with the natural scientists. A preliminary meeting will be held this evening at 7 o'clock in order to complete all of the Society's arrangements. Tomorrow the public meetings begin at 12 o'clock, when I shall give a lecture. The natural

scientists will eat at a common table on each of the 6 days of the meeting.

So, here you have a long letter that gives you a survey of my entire life here. I must close now so that the letter can go with the post. Give my love to Karen and Marie, and Anders and Nicolay. I am sorry that I could not be at home on his birthday. Regards to your sister and Gitte and Sophie Hasle if she is at home. Regards to my brother, Sophie and Mathilde from Christian, who has written to Sophie. Ask Marie to give my regards to P. Hasle. Regards to all good friends as well.

Your forever lovingly devoted
H. C. Ørsted.

Stockholm, July 15th 1842

Dear Gitte,
Although there is very little time before the post leaves, I must let you have a few words from me. The day before yesterday, Wednesday, we held our first public meeting. After Berzelius had said a few words of welcome, I got the floor and gave a lecture on beauty seen from the natural scientist's point of view. I felt in perfectly good form and therefore spoke completely freely. You know that I have long pondered the things that I had to say. I had the good fortune to be well received. The Crown Prince of Sweden, who was in the audience, took me by the hand at the end of the lecture and said many courteous things to me. Everywhere I received the most flattering expressions and, among them, from people who do not flatter, for example, Professor Schouw. Wherever I go since that day, people recognise me and pay much attention to me. For example, yesterday I went to the royal picture and sculpture museum at a time that was not reserved for the natural scientists but for the general public, but the director recognised me immediately and took such good care of me that in the ¾ hour that I had at my disposal, I saw more than I could have seen in 2 hours without such kind help.

Today Forchhammer has given a lecture that was also very well received, which was fully deserved. So far the Danes have acquitted themselves with credit both in the public meetings as well as in the

section meetings. In the physical section Scharling gave a lecture on respiration, which was very successful. Berzelius said that the delivery was masterly. Holten has also given a lecture that did him credit. Today Hummel gave a lecture that was also estimable, but he made it too long and lacks the beautiful delivery of Scharling or Holten. In the phys. section, Zeise gave a lecture which made a poor impression despite its good contents; no-one understood it, and people very nearly fell asleep.

I am obliged to be very incomplete. Among other things which I would like to mention is that I have been assigned a seat on the same bench as the Crown Prince. The meetings end on Tuesday. On the same day the King will give a dinner for all the natural scientists. It is said that a presentation of honours will also take place. On Wednesday and Thursday we shall make a trip to Upsala at public expense. **Christian** and I are to stay with the elder **Swanberg**, Scharling with the younger. On Friday we say farewell. On Saturday (one week from tomorrow) we begin our homeward journey and shall probably arrive on Monday.

Christian is doing very well, and a *Hofjægermester*[4] Ström is showing him around all the institutions related to forestry.

I hasten to close and send my love in extreme brevity to all of you together.
Your lovingly devoted
H. C. Ørsted

4. A title given to selected landowners who supervised the royal hunts.

7.
Journey to Germany (July - August 1843)

To Inger Birgitte Ørsted:

Berlin, July 20th 1843

Dear Gitte,
It will be necessary for me to write my letters piece by piece like a journal, for I am interrupted so frequently that it is not possible to think of coherent letters. After I had written to you on Wednesday[1], I went to have coffee with *Conferentsraad* Rist, who was staying in the same hotel as I, along with his wife, a daughter and two sons. There I met Steffens with his wife and daughter. Steffens and I had a very lively conversation with Rist about the language issue, in which he showed himself to be a stronger supporter of Schleswig-Holstein than I had expected; however, the conversation did not become heated even though it was very lively. It was interrupted by Chief Mining Councillor Karsten, one of my oldest German friends, who, through an oversight on the part of the servants in the house, had not been informed that he was visiting me in another man's room. He thought that I had my entire family around me, and I imagined that he knew where he was. It was only later that I corrected this error. In the evening I was with Weiss, where I was treated with the old friendship.

On Thursday, the 20th, I saw Rist, who was about to leave, and had a very friendly conversation about the language issue, which did not lead to agreement, but which may lead him to reconsider several aspects of this issue. He has much friendship for my brother and me and spoke with the greatest enthusiasm about my brother. – I was to have travelled to Potsdam on Thursday morning, but in

1. This letter is not in the collection of The Royal Library.

the morning before 7 o'clock, I received a letter from Steffens in which he let me know that on Wednesday evening he had spoken with Humboldt, who had told him that he would not be in Potsdam on Thursday. Later in the morning Humboldt came to me himself, and on this occasion we agreed that I should come to Potsdam on Saturday (the 22nd) to visit him although he believed that I would not be granted an audience with the King until some later date. Later in the morning I paid a great many visits, but naturally found only some at home and left my calling card with the others. Among those whom I found at home was Savigny, the minister, with whom I had a rather long conversation. He spoke of my brother just as I would wish it and sent many regards to him. He also spoke of Bishop Mynster with the greatest respect. He does not know him personally, but he has read his reflections, which he had found excellent. As you know, we do not disagree with him about this. I also found Privy Councillor of Justice Hefter at home; he also spoke much about my brother, in the same spirit as Savigny. When I came home, I received a visit from Privy Councillor Beuth, who makes large profits from Prussian industry. In the hotel here one eats dinner at 3 o'clock, but in most houses at 2 o'clock. After the meal I went to the Academy, as their scientific society is called. It begins at 4 o'clock in the afternoon, which is a most inconvenient time. I heard a paper by Prof. Gerhard[t] on antique representations of Venus. I saw Wilhelm and Jacob Grimm, Ehrenberg, En[c]ke and others. The meeting was not particularly interesting. – In the afternoon at 6 o'clock I went to Steffens, where I had been invited to hear Tieck read a play. He read *The Clandestine Marriage*[2] with all the perfection that he is famous for. He has recently been ill; it was said that he would no longer be able to read, but he did so with much force and did not even stop between the acts. We later spoke about **Holberg**, whom you know he regards as highly as any Dane. He only expressed dissatisfaction with Don Ranudo[3]. He claimed that one could countenance laughing at Don Ranudo's poverty or at the value he attached to the fame of his forebears. A young nobleman,

2. An English comedy (1766) by George Colman the Elder (1732-1794).

3. *Don Ranudo de Colibrados* (1723), a comedy by Ludvig Holberg.

I think a Mr. v. Sternheim, agreed with Tieck about this. I answered that I imagined that according to the coherence of the play Don Ranudo must be regarded as a man without any ability to make a living, neither by serving his fatherland nor in any other way. He is portrayed as a powerless, conceited man, whom no recollection of his own exploits nor awareness of his own powers makes respectable. I said that Holberg has, with great impartiality, now ridiculed learned pride, now purse pride; why not aristocratic pride? I added that I might fear expressing a view which differed from that of the man whose judgement of Holberg must be given such great weight, but I could not refrain from this defence, which I thought had some merit. One of the party objected that what I said here could not be applied to the wife, but it seemed to me that she was his worthy spouse, who was well-suited to share his fate. –The more I think about this play, the less I find the ridicule which Holberg here levels against ancestral pride to be inappropriate. It seems to me that he has excellently presented arrogant worthlessness as even more ridiculous by contrasting it to the fame of the ancestors. – The sculptor Tieck was also present, as was Professor Gerhardt. I was home by 11 o'clock.

It is now Friday evening (the 21st). This morning I had a visit from *Kammerherre* Löwenörn, our chargé d'affaires. He was very courteous and sincere. Tomorrow evening I am to attend a party at his home. I have spent the greatest part of the morning at Poggendorff's, where I have seen many beautiful instruments. I ate dinner at Weiss', in the company of Lichtenstein, Ehrenberg, Poggendorff, Magnus, Heinrich Rose, Karsten and one of his sons, who is already beginning to show himself advantageously as a physicist; the geographer Ritter, Prof. Horckel and one of his sons were also there. Both Ehrenberg and Lichtenstein expressed themselves most favourably about Anders Ørsted's dissertation on annelids, which I had brought with me. He can now expect a good reception when he comes here. – I must relate how Weiss toasted me. He said that he would propose a toast to a party of 14 people, that is, the present guest, his wife, his 7 children, 3 sons-in-law and 2 grandchildren. Thus my entire household was remembered. – During the conversation at table I seized the opportunity, as so many well-informed

men were present, to ask about Berlin's water supply in order to know if there was something we could learn for our city; but I learned that mostly they just have wells, and that those who use great quantities of water must take it from the Spree, but there are no water mains from there, so they must take the water from the river itself. They have thought about a big improvement, but that may not happen for a long time. Families are often greatly embarrassed when they have their washing day, and it has not rained for a long time because they gather rainwater for their washing.

It is well-known that Berlin has long been a very beautiful city with broad streets. It has become even more beautiful in recent times, but it also has its discomforts. I know of no place where one suffers so much from dust as here. Since the region is extremely sandy and the streets very airy, strong gusts of wind frequently envelop us in a dreadful haze of dust, compared to which the dust that a dry easterly wind can start in front of *Frue Kirke*[4] is insignificant. Another inconvenience, which is less to be expected, is the strong stench from the gutters. It is so common that I cannot spit every time I meet this stench. Also in the deer park, just outside of the city, I found that a pond which I passed emitted a foul stench. On the way back I made a detour to avoid it.

Berlin, July 1843

On Saturday the 22nd I tried my first journey on the railway; it was to Potzdam in order to visit Humboldt. From the hotel where I am staying to the station from which the trains depart, it is about ¼ mile; this causes a certain waste of time. It is about 3 ½ miles to Potsdam, which is covered in 48 minutes, so that it takes less than 1 quarter of an hour per mile, which is still only a moderate speed for a railway, as you well know. There are seats at very different prices. As you know, the steam-engine pulls an entire string of carriages behind it. In the first-class carriages one pays 20 silver *groschen*, 5 marks 5 *skilling* Rbd; in a 3rd class carriage one pays only 8 silver *groschen*, about 2 marks 2 *sk*. Rbd. In the best carriage one sits as in a very comfortable coach. Andersen has described the way one sees

4. The Church of Our Lady, the cathedral in Copenhagen.

objects from a railway carriage so well that I had better refer to him; I just want to emphasise that, at this speed, one can easily enjoy the view of relatively distant objects if near ones do not disturb the eye with their rapid motion; which is what happens with trees along the tracks, for example. The motion is not so free of rumbling and shaking as I had thought.

Humboldt received me most amicably and wanted me to tell him precisely how I had made my electromagnetic discovery, which he otherwise knew very well to be a consequence of the line of thought that I had presented in earlier writings. He spoke of many other subjects with his usual passion, which rarely gives others an opportunity to add anything. He has an enormous memory that includes the most varied subjects; numbers, shapes, dates, as well as the actual contents of events are vividly present in his mind; perspicacity and wit are always at his service. He always has news about the latest discoveries, to which his extensive correspondence contributes much. Through his connections with sovereigns and the most influential men, he accomplishes a great deal. He has induced the Russian Emperor[5] to offer 120,000 roubles for the establishment of a meteorological observatory since it is no longer useful, given the present developments in science, to let this be a secondary matter for astronomical observatories. Similarly, he has induced the Russian Emperor to have many magnetic observatories constructed in Asia, indeed, even one in Peking, to which the Chinese Emperor must have given his consent. – He invited me to the Royal table the following day at 2 o'clock. That is how early they eat here; 3 o'clock if it is to be very late. – I had to remain in Potsdam until 4 ½ after having left Humboldt at 1 ½. I went to Capt. Reinhardt, who was here with his wife some years ago, but they were on a little journey to the Harz. It rained and blew so much that I could not look around in the area. There was nothing left for me to do but to stay in a restaurant that belonged to the station and eat dinner there. I ordered the simplest meat dishes that I could find, but they were so saturated with mediocre butter or fat that I was only able to eat a little of it and still suffered from it afterwards. I wanted a book to

5. Nicolai I (1796-1855).

pass the time. I got a new translation of *The Vicar of Wakefield*[6], which I read with pleasure even though I know it quite well. I was home again by 5 ½. In the evening I was at Löwenörn's, where I found very few guests; among them was a General Reiher (I do not know if I spell his name correctly), who was very well informed, and Professor Dreyer from Copenhagen. – I came home with a bad colic which disturbed me all night and exhausted me so much that I shuddered at the thought of going to the Royal Table. As the day progressed, however, it became better and by 1 o'clock quite tolerable. At 11 o'clock I left on the steam-carriage, and around 11 ¾ , I was in Potsdam, where I, as I had arranged with Humboldt, went to the hotel *der Einsied[e]ler*, changed, and waited for him. He came to fetch me at the appointed time. When the party was assembled, the King[7] arrived. I was presented to him. He said, "I am very pleased to see you here." Naturally, I conveyed the greeting to him that our King had enjoined me to deliver, which he accepted as could be expected. Then I expressed my personal thanks for the Order of Merit[8]. Later he spoke about **Thorvaldsen** and enjoined me to point out to him how easy a journey to Berlin would be now and encourage him to make it. I was also presented to the Queen[9], with whom the conversation was only about the present ease of journeys and the consequent benefits. I was introduced to many gentlemen of the Court, but so many new acquaintances pressed into such a short time leave little trace. At table I sat opposite the King and had Humboldt on one side. The King spoke a few words to me now and again, but a proper conversation could not take place here. On the other hand, I spoke a great deal with Humboldt. After dinner when the King left the hall where the audience was held, he said that he would not take leave of me but hoped to see me again. After dinner Humboldt remained in his rooms at the palace but had me driven, in a royal carriage at his disposal, to the hotel, where I changed as much as the journey required with the greatest haste and was

6. Novel (1766) by Oliver Goldsmith (1730-74).

7. Friedrich Wilhelm IV (1795-1861).

8. *Pour le Mérite* awarded for contributions to science and the arts.

9. Elizabeth Ludovica of Bavaria (1801-73).

brought to the station in the same carriage, arriving ½ quarter of an hour before the departure.

When I came home, at 5 ¾, I rested again and then went to an evening party at Schelling's at 8 o'clock. There I found Ehrenberg and Weiss and a Dr. Partheyer, who is a bookseller but also a scientist. He is the son-in-law of Nicolay, who was a famous bookseller in his time, and who long enjoyed the reputation of a man of letters until he quarrelled with the philosophers. Schelling's daughter and her husband, Assessor Eichhorn, the son of the minister, were also there; a grown son of Sch., too. The conversation was very lively and turned on many different subjects. Mrs. Schelling recalled with pleasure that, in 1822 in Nürrnberg, I had had a thermoelectric ring made for her in order to demonstrate Seebeck's then new discovery.

On Tuesday the 25th **Magnus** took me to Dr. Riess, a rich man who devotes himself to physics without having any post. He occupies himself particularly with the theory of electricity and especially with frictional electricity. This subject has been studied less during the last 40 years than galvanic electricity, and he now applies to the former all the insights which the latter has brought us. He has found means to perform the most accurate measurements on the great electrical effects that the electrical machine produces.

After returning home from Riess I wrote down some of what I had seen and then waited until Ehrenberg came to fetch me to a banquet to which the Berlin scholars had invited me. The party was gathered in a magnificent hall in a place called the Odeon in the deer park. I sat between Humboldt and Schelling. Next to Schelling was the great painter **Cornelius**, who introduced himself to me in the most flattering manner, saying that he was also a natural scientist, as was every artist. He spoke with the expected enthusiasm about **Thorvaldsen** and wished that he would come to Berlin. I promised to tell him so but also expressed the wish that **Cornelius** would visit Copenhagen. At table I was toasted by **Weiss**, who sat across from me with **Karsten** next to him. **Weiss** began by saying that I had stayed here during the first years of the century, when Volta had recently opened such great prospects for science with the discovery of his column. He mentioned the most important discoveries that had been made with it until 1820 and stated how keenly

people during that time had longed for a result from it regarding magnetism; but that this had only come with my discovery: From that many others had blossomed, among which one of the first and most beautiful was that by **Seebeck**. But 23 years had now passed since my discovery without any new epoch having commenced like the ones which began with Volta's in 1800 and mine in 1820, whereas people continue to build upon this; and the time will not be far off when it sets ships and vehicles in motion and helps us (Berliners) to visit Copenhagen. But we must also remember that he has a brother who, in another discipline, has attained the greatest distinction; they are two brothers who constitute a shining binary star. – I expressed my thanks in a brief speech, in which I said that it is a well-known pleasure to receive honours from men who have earned so much honour themselves. This happiness fell to my lot at this moment to a degree that could scarcely be exceeded since I here received so much honour in a circle that contained so many men of great merit, whose discoveries would be preserved in the annals of science and carry their names to posterity, and among these men even those whose names would shine with the greatest brightness. – I made this speech short because I intended to say more at the end of the banquet. No more toasts were proposed, but at the end of the meal I rose and said something like the following: Before we part, I request your permission to repeat my thanks for these glorious hours which I shall always remember with pleasure. Many memories are associated with this. It was, as my friend Weiss remarked earlier, in the first years of our century that I first saw **Berlin**. I had just begun my career at home as an academic teacher but was still very young, and I acknowledge with gratitude the great kindness with which Berlin's most famous scholars allowed me to exploit their insights and develop my own through discussions with them. Berlin had a high scientific standing even then, but how much has it not grown since! This is now the 5th time I see it, but every time with new growth. The increasing size and population are the first things that one notices, but its growth in everything related to science and art is probably even greater. It was with true pleasure that I once heard that Berlin got a university. It was as if someone had given me a wonderful gift, for I belonged to those who expect-

ed much for science from this institution, and we all see with pleasure that these expectations have not been disappointed. Berlin has more and more become the focus for German science, not to dominate it but to act with even greater power just as the light of the sun, when ingenious art has compressed it into a narrow space, produces effects that the dispersed rays cannot accomplish. This little speech received great praise. Linck, the old botanist, came to me and thanked me for it, as did many others. – The party had been arranged by Lichtenstein, Weiss, Karsten, Poggendorff, Magnus and someone else, whose name I cannot remember at the moment. – The number of guests was more than 70.

This morning, Wednesday the 26th, I have again visited **Magnus** and seen several beautiful experiments. Later I have received many visits and hasten to end now. Love to all our dear ones. Give my brother the enclosed letter and apologise for the clumsy signature. I shall enumerate no-one. They know me as I know them. I think about you often and talk with several friends about you. Be well, my precious Gitte, and let me hear from you soon. I shall probably remain here for the rest of the month.

Your

H. C. Ørsted.

Berlin, July 1843

Dear **Gitte**,

After I had written to you on Wednesday the 25th[10], I visited the great painter **Cornelius**, who received me with great kindness. I did not stay with him long as I learned that he had a toothache. I also visited the brothers **Wilhelm** and **Jacob Grimm**, who live nearby. Only **Jacob** was there. He is unmarried but lives with his brother, who has a wife and children. While I was with **Jac. Grimm**, his brother's eldest son, about 13 years old, returned home from a short journey, which was the first he had taken alone. He came in to his uncle and showed him the warmest affection. **Wilhelm** came home at the same time, but I soon took my leave as I sensed that the whole family were much moved by this homecoming. In the evening I was

10. July 25, 1843 was a Tuesday.

invited to **Steffens'**, where his nephew from Norway was with his young wife, **Pistor** with his wife, Alberti's widow, Privy Councillor Uden and a Privy Councillor **Rückmann**, who is employed at the ministry in connection with the educational system. He told me that a philological educator is never appointed rector of a real school[11], but that one always appoints such a person as the rector of a gymnasium. There is now a seminary for higher school education in Bonn, which will be of considerable benefit.

Thursday the 27th I had a long visit from Löwenörn. As soon as I could, I went to the physicist Professor **Dove**, where I saw his new experiments and ordered some of the instruments he has devised for our technical university. I spent a large part of the day reading through some printed pieces about which I later wanted to speak with men who could provide information about these matters. In the evening I was with Professor **Magnus**, where we were to have tea in the garden, which is very large, but were chased inside by a rain shower. It rains very frequently here. Except for some ladies, the party consisted mostly of men whom I have often mentioned before; however, I became acquainted with a Dr. Froriep, the son of the well-known doctor from Weimar. He occupies himself, most successfully as it seems, with the application of magneto-electricity to illnesses, rheumatism in particular; it is also used for hardness of hearing. I also became acquainted with a Privy Councillor **Ditherici**, who is both a professor and a member of the Government. He asked me about the language dispute in Schleswig-Holstein and seemed very satisfied with the information I gave him. At table I got to sit opposite Linck, who is very ardent in spite of his great age. He was somewhat familiar with Danish and Swedish and cited poetic passages, which he pronounced quite well.

In my account of this day I left out the fact that I was in the Berlin Academy (the Society of Sciences) and heard a paper by **Jacob Grimm** about the old German practices regarding border conditions. – I was with **Weiss** for an hour to see an electrometer that a poor young student from Königsberg had devised. They would like him to be recommended for support and expect much from him;

11. German *Realschule*, corresponding to a secondary modern school.

however, it did not seem to me that anything of significance could be derived from what he showed and said. I praised the thoughtfulness that he had shown, but I told him honestly that the apparatus first had to be made with greater precision and tested thoroughly before one would be able to say if it might, under certain circumstances, have advantages over others.

Friday the 28th I was at Potsdam with **Ermann** and his family, who had invited me. We travelled there on the steam-carriage. Mrs. Ermann, Professor Ermann, the son[12], his wife, and her sister were there. The last two are daughters of the astronomer **Bessel** in Königsberg. The old **Ermann**, who is now 80 years old, is in very good health. He is one of my oldest living friends in Berlin from 1801. He was also present at the banquet I wrote about last time. When my health was drunk, he shouted long live **Columbus Ørsted**. I mention this partly as an example of his youthful ardour, partly also because **Hershel** has used the same comparison about me because I constantly had my goal in view for many years and finally found it to everyone's surprise. – However, I return to the journey. As soon as I had come to Potsdam, I paid a visit to **Humboldt** and then went to the Cadet Academy, where Captain **Reinhardt**, **Ermann's** son-in-law lives. He was on a journey, but his wife was at home. She was very friendly and remembered all the particulars of our home. She sends many regards, especially to you and Karen. As it was 7 years ago, and it was mostly Karen who accompanied her around, it is natural that she knows her best. Mrs. **Reinhardt** had seen quite a lot of Zeeland and had greatly enjoyed the natural beauty of our island. – They showed me around here in the vicinity of Potsdam. We filled 3 carriages, for the young Mrs. **Ermann** had two children and a maid with her. Mrs. Reinhardt also has a grown daughter at home and one married. A son was travelling with his father. We drove to Badersberg[13], where there are two castles, one for the King's eldest brother and one for a younger. As the King has

12. Georg Adolf Erman (1806-77), German physicist in Berlin.

13. Schloss Babelsberg in Potsdam, summer residence of the King's eldest brother Wilhelm Friedrich Ludwig (1797-1888), Wilhelm I of Prussia from 1861 and German Kaiser from 1871.

no children, one can expect that his eldest brother's son[14] will inherit. The King's eldest brother is married to a princess of Weimar, from whose drawings the entire castle in which they live was built. She has sought an old-fashioned style, including all the furnishings. Everything is rococo. I have never seen such a return to times past executed with such consistency. – People praise the upbringing that the young prince is receiving. – From Badersberg, where we mostly walked, one had a view of another hill called Brauhausberg, which is not characterized by any particular beauty. Badersberg, which I can see I am describing most unsystematically, is a large park or English garden, where it is permitted to drive in to certain stopping places. In order to create respites from the views, they have built various things, including a church that has great architectural artistry, but for which there is no congregation. Be content with this confused report of the walk, I should have thought it through in my head before committing it to paper. – **Ermann** had ordered a meal for us at the station, where we arrived at 5 ½. The meal was not so bad as when I ate here alone the other day. – We were back at 8 ½. I then hastened to **Pistor's**, where I had been invited with friendly insistence. A Miss **Zschokke**, the daughter of Pistor's sister, had become engaged the same day to a Mr. v. **Knobelsdorff**. The party was in very high spirits, and I felt right at home. I had an interesting conversation about languages with **Jacob Grimm**. He knows Danish and Swedish and also Icelandic very well; you know that.

Saturday the 29th. This morning there was a splendid burial of the recently deceased Prince. I could have had a seat in the church but did not want to subject myself to the long waste of time. I saw the procession from my window. The hearse had no canopy, but the coffin was covered with black velvet with crowns and a coat of arms, on top of which were swords and the like. The military displayed the fine bearing for which it is famous. However, I noticed one thing that was not beautiful. As I saw the foot-soldiers from the side, carrying their rifles with the bayonets in the usual manner, I noticed that they created a very disorderly image as it is impossible to hold them all parallel.

14. Friedrich Wilhelm (1831-1888), German Kaiser Friedrich III for 99 days.

Later I visited **Tevesten**, who must stay at home because he has hurt his knee, and then **Lichtenstein** at the museum. It is still far from being finished, but the birds are extremely well displayed, also some mammals and the fish. Everything is large and magnificent.

This is now the 3rd time I send you a letter. But I have still not heard from you or any of our daughters. However, I am not uneasy; the young **Reinhardt** has recently arrived here and has been to our house before his departure but learned that you were in the country as we had discussed.

I shall remain here until Saturday, August 5th. Letters should be addressed to **Meinhardts Hôtel unter den Linden**.

Receive my most loving regards and give them to all our loved ones. No matter how comfortable I am here, I still long for you and home.

Your
H. C. Ørsted

Berlin, July 1843

Dear **Gitte**,

When I had sent my letter to you last Sunday, I had a visit from *Conferentsraad* Scholz, prefect in southern Holstein. He is staying at the same hotel as I and has seen me at **Spies'** in Schleswig. He is a very well-read man, and our conversation was mostly about scientific matters. Then it was high time to go to **Weiss'**, where I had been invited for the evening. At the large party I naturally spoke to many people; I shall only mention a few. I met a Professor Trendelenborg, who once, when he was a very young man, dined with us, brought by Forchhammer. He is now a professor of philosophy. A natural historian, Gloger, who has distinguished himself particularly by his work on birds, spoke a great deal to me about learning Danish and Swedish, with which he had already made a start. There seems to be a strong desire here to become familiar with the Scandinavian languages, and some beginning has been made; I would like to make some proselytes to this. – I had a long conversation with Schelling about conscription in Prussia. He found that it had had an excellent effect both externally and internally. Everyone knows that military service gives young people a better posture which lasts

all their life. They learn to obey in disciplined fashion, which he claims manifests itself perceptibly in servants and other people of the lower class, which he discovered by a comparison of the experience he had had here over 40 years ago and now. He believed that many good habits which people thus acquire in the military have a beneficial influence on their morality. Since this matter is also of interest for our country, I want to ignore chronological order and mention here a conversation I had the following day with Lichtenstein about the same subject. He is a man of the world in the best sense of the word. His knowledge of natural history, which places him so high, is united with a great deal of other knowledge, much experience both from extensive travels and from a rich life in commerce. He is, in an unusual manner, in possession of general confidence and esteem. He stated precisely the same opinion as **Schelling**, but our conversation was more detailed and instructive. Of the potentially harmful effects that military service could have on the youth that are destined for higher education, he said: I can speak as a father and can assure you that this matter is without risk. But if the effect is not to be harmful, the system must be as it is here. Every young person who has at least gone through a gymnasium until the next-highest class gets off with one year of service if he equips himself. It is not necessary to have been in the highest class of the gymnasium to obtain this exemption, but if one has only been at a real school, it is necessary to have completed the highest class. In the absence of all this one has to subject oneself to an examination by a special commission. These one-year soldiers are very privileged. Of course they must learn how to drill, participate in several exercises and serve some watches, but they can have most of the watches served for them. The officers are instructed to treat them with politeness, which they are obliged to do with all their subordinates. Even if he does not belong to the privileged class, a soldier can speak quite freely to his officers even though military discipline is strictly maintained. Military punishment is as good as unheard-of. I asked if the privileges which are granted to those who have attained a certain level of education did not rouse envy among the others. He answered no, for they know that the others must pay for it; moreover, they have the direct advantage of being paid for a great

many watches which they take for the others. The young people who are privileged must still spend some time with the others on watches and during exercises; hereby they are forced to maintain good comradeship with them, but through a natural sense of honour they feel called upon to exercise caution so that comradeship does not degenerate into familiarity. They thus become accustomed to self-discipline and an awareness of personal dignity that have the best consequences later. Among those who do not enjoy the greater privileges, many are chosen to drill the others and are thus held to the decent behaviour that is strictly demanded of them. When a peasant's son has completed his 3 years of service, he has learned how to lead his little circle through the practice of obedience and has raised himself through interaction with comrades of higher education. They attempt to persuade those who have performed well during the three years to extend their service by offering them all kinds of privileges. This is found to be necessary as an army in which no-one has served more than 3 years can have no true cohesion, but as they force no-one but rather choose the best, the army always retains a core of excellent people. Those who have served for 9 years or more can hope for some minor post, as a messenger, a postman, a custom-house officer and the like; all such positions are given exclusively to old and deserving soldiers and to none who has served for less than 9 years. If such old soldiers return to the country, they are normally the best qualified to become parish officers and the like. Those who only serve one year often pass the officer's examination without necessarily wanting to remain in the army, but then they get the title of officer and can receive a command and become officers in the *Landwehr*. I have also spoken about this with Professor **August**, a physicist who is also the director of a large gymnasium, and later with Privy Councillor Schulz, who is a member of the Government. Everyone agrees about this matter. In the beginning people were often very dissatisfied with it, partly because of its novelty, partly because they took things more strictly then. They show great indulgence, e.g. they readily grant a leave of absence of several months when reasonable grounds can be given, for example, a coming examination, but the period of leave must be served later. The young people are not summoned to service by the deci-

sions of their superiors, but they enlist in the year that is most convenient for them, within certain limits, the 23rd year, I think. They are also quite free to choose the place where they want to serve. Many uneducated men spend their years of service in Berlin and avail themselves of lectures and other education. – The expenses for military service are a burden. They must buy the uniform and pay for many watches. It is not deemed suitable for such a young man to perform all his watches himself.

Sunday morning (the 30th) I was with Poggendorff from 9 ½ to 12 ½ and saw many new experiments and useful new instruments. I then went to Schelling, with whom I continued a discussion about light begun the evening before. He said little about his ideas, but given this opportunity, I attempted to show what are certain and unquestionable laws of nature in the new theory, and what are hypotheses. I also visited Mrs. Schelling on the same occasion. I ate dinner at Link's, where Lichtenstein, the brothers Rose, Mitscherlich, Poggendorff, Dove, Ehrenberg and others were present. Link is an excellent host. Although he is a widower, the food was excellent. The wine was also good. He served more kinds than I could try. The host was quite merry as was the rest of the party. After the meal, I drove with Lichtenstein, Gustav Rose and Mitscherlich to **das Kreutzberg**, where a large iron monument[15] has been raised to the Prussian victories of recent times. It has many crosses, from which it is said that the name *Kreutzberg* comes. Mitscherlich has his country house nearby. Mrs. Mitscherlich came along to the monument, which stands on an elevation from which there is a beautiful view. One finds many figures on the monument along with years and dates for the victories won, but I do not deny that I was somewhat taken aback to see kings, queens and princes shown on it but very few of the generals who won the victories. I noticed only **B[l]ücher**, but there may well be one or two more, which I could not determine as I did not recognize their faces, and Mrs. **Mitscherlich** could not name more for me. We wandered about a little to see the surroundings, where Rose and Mitscherlich pointed out the places

15. Monument (1821) by Karl Friedrich Schinkel (1781-1841), Prussian architect and town planner.

that displayed a great similarity between the formation of the earth's crust in Brandenburg and in Denmark.

On Monday the 31st I had a visit from a Dr. Girard, a young geognost, who wishes to be appointed in Kiel. I naturally told him how little influence I have in this matter, but otherwise spoke with him at length. He knew Schöler and liked him. I missed Beuth but found August, who showed me several beautiful and well-devised instruments. From there I went to Ehrenberg, who showed me drawings of the countless small animals, for the most part only visible under the microscope, which he has found in tripoli[16], chalk, flint, opal etc., but of which many living examples can still be found. He had obtained rocks that contained the remains of these animals from North America and South America, from the Antilles, from Australia etc. He had even obtained many living specimens. His experiments and observations show that enormous layers of our earth are almost entirely composed of these animals. Berlin itself stands on a mass of these animals, of which many are still alive and move a little. Everywhere it must generate the greatest attention that entire mountains and large stretches of land are formed from the remains of such small animals. It is also quite remarkable that one finds that where chalk changes to flint, these animals follow it, and in a well-preserved state, too. Another remarkable[17] observation is that an enormous number of these animals, which still live in the ocean, are to be found in the Elbe and on its banks as far as the tide goes up the river, but only alive as far as the water in the river contains a good deal of salt water; farther up where this is not the case, they are only to be found dead. This shows that the sea water at high tide does not merely push the river water back but really mixes with it, which is also known for other reasons. That there are many other such small animals that live in fresh water is not contrary to this.

From Ehrenberg I went to the museum, a magnificent new building which is not quite finished, but in which works of art are already displayed. Professor Gerhardt showed me around, but I was forced

16. Tripoli = rotten stone.

17. At the top of the page that begins here Ø has written: Berlin. August 1843.

to limit myself to a brief overview. I was so completely exhausted by looking and walking long distances that I had to try to have half an hour or more at home in order to rest before I went to dinner. I had been invited to Karsten's. Before we dined, the son, Dr. Karsten, showed some beautiful experiments by creating images of coins etc. with electricity. He also showed a new method for creating the old electrical figures with great perfection. Link, Weiss, Ermann, Lichtenstein, Dove, Poggendorff, Magnus and others were at the dinner; in particular, I must mention the old sculptor Schadow, who is much weakened by age but still very cheerful. He toasted me with much mirth and many joking attacks on his friends, some of which were answered by their interrupting him with all manner of retorts.

On August 1st I was at the Trade Institute with Privy Councillor Beuth; not to see the Institute this time but to talk with him. He is the one who actually directs all industry in Prussia. I brought up the question of freedom of trade and mentioned the supposition which has been expressed here and elsewhere that one had experienced harmful consequences of it and wished to limit it. He told me that this was definitely not the case. The rumour could be explained in part by the fact that a decree was to be issued about the trade police, but that it was definitely not intended to restrict freedom of trade but rather to extend it to the recently added provinces of Pomerania and Prussian Saxony. The King did not want to prohibit the guilds there, but no-one should be obliged to enter a guild in order to obtain permission to carry on a trade to the full. If the guilds wished to continue under that condition, however, their guild regulations would have to be examined and would not be valid without the approval of the government. However, he seemed to believe that it would be best to abolish the guilds completely. Wherever in these provinces one finds what are called real rights, such as those thought to be belong to the bakers' guild in Copenhagen, they should be replaced. People in one trade are allowed to form corporations, but only for such purposes as the supervision of apprentices, support for needy journeymen or worn-out masters but not for technical purposes. No-one is forced to join them because he has the same trade as the members of the corporation. When such a corporation is formed, they try to unite several related crafts in a single corpora-

tion, indeed, even crafts that are not related. In small towns all craftsmen might even form a single corporation. One does not require examinations except in those crafts which, by doing poor work, could be dangerous for the public, for example, architects and millwrights. According to the same principle, they should also demand examinations for machine manufacturers, but he said that this inconsistency would remain since no-one can open a large machine works without investing a lot of money in it, which he loses if he does poor work. – The Standards Department is under a higher commission which is responsible for weights and measures; the one under it supervises the standards that are administered by the magistrates. The standard weights and measures of the magistrates are examined every 4th year and sometimes at extraordinary times. One even permits travelling for such purposes.

I then visited Mitscherlich, who has the advantage of having a quite beautiful residence equipped for his profession. He has made excellent use of this advantage. It would be too much to describe everything that I saw here. I have made notes of what I most need. But any man who gives lectures on technical chemistry could benefit from studying his excellent collection of models, drawings and lecture equipment. One month would not be too much. – From Mitscherlich I went to the widow of the famous physicist Seebeck, who was very pleased to see an old friend of her husband's.

In the afternoon, with Poggendorff, I visited Engineer Oertling, who will do some work for our collection. He has an excellent divider, whose construction he explained with a clarity and precision that would not have shamed any public teacher.

I spent the evening with Weiss.

On Wednesday August 2nd I spent the time from 9 o'clock to 11 ½ with Dove, where Weiss also came. He showed us several interesting instruments and experiments related to optics. From there I went to August, who is the director of a gymnasium. I was shown into a room where he would come, but it turned out that I had not been announced. I read some newspapers that lay there, but when no-one came, I rang a bell, and when a small son of the house came, I said that I would not go without leaving a message and asked him to give my compliments to his father. But now everything was ar-

ranged, and I saw the few remaining instruments that I did not see the last time.

I was invited to have dinner with Dr. Ries, who spends his summers in Charlottenborg about 1 mile from Berlin. I drove out there with **Weiss**. The other physicists were there as well as Karsten, the brothers Rose etc. After the meal I visited Mrs. Rose, the mother of these brothers, who lives in Charlottenborg in summer. – I walked back to Berlin with Weiss, Henrich Rose and Karsten.

On Thursday August 3rd, I first visited Erman, who did not have much to show me. In the neighbourhood I visited Professor Passow, who came to see me in Copenhagen on the day before my departure without meeting me. He is married to one of Seebeck's daughters, who was very pleased to see me. I had to see all her children. On this occasion, the conversation also turned to you, dear Gitte, and to our children. Passow was extremely pleased with his stay in Copenhagen and seems to like both the country and the people a great deal.

Later I attended a ceremony in the University building in memory of the previous King, the founder of the University. Raumer held the speech, which I and several others could hardly hear. It was the first University speech here held in German. Many professors have opposed this. Among others, I heard one reason which deserves to be mentioned for the sake of its super-cleverness: There should be no changes at all at the University because it was impossible to know what other changes this might bring about. "Which ones?" I asked. "They may take away our liberty of teaching," was the answer. "But if they want to do that, they will hardly be deterred by the retention of Latin," I objected again. "Perhaps you believe," they answered, "that such steps could not be taken? Just look at Austria; everything that is to be taught at university is prescribed there." "But have they abolished Latin there," I asked in response. "*No*," they had to answer. Is that not a beautiful reason?

On Friday August 4th, I visited **die Gewerbschule** under the guidance of Prof. Schubarth, of which I have made copious notes for my own use, but here I shall be content with praising the kindness with which everything was shown to me. – I then visited Dr. Ries, with whom I again saw some new experiments and was introduced

to Engineer Kleiner, with whom I am having several things made. – From there I went to Heinrich Rose, who showed me several interesting experiments and give me some small things for Scharling, whom he remembers with much friendship. I ate at Weiss' with a Privy Councillor and Mayor Pirer from Breslau and his brother, a Dr. Pirer, an antiquary, and their family. Ehrenberg was also there.

I shall close here in order to send off the letter, but before I end, I must praise the great courtesy which I meet everywhere here. It is almost as if I were at home. In spite of all this, I am beginning to long more for home so that I would certainly be very homesick if I ceased the activity with which I strive to make use of every moment. On Wednesday morning (August 9th) at 11 o'clock, I shall travel to Leipzig and can expect to arrive there at 6 o'clock in the afternoon. On the 15th I shall be in Berlin again and on Wednesday the 16th depart for Stralsund etc. so that I hope to come to Copenhagen on Friday the 18th in the morning at 6 o'clock.

How happy I shall be to see you again, dearest Gitte, and all my loved ones. Love to them all. No matter how comfortable I have been here, the sight of the Danish coast will give me heartfelt joy.
Sent August 5th.
Your
H. C. Ørsted.

Berlin, August 1843

Dear Gitte,
This letter is still written in part in Berlin. Yesterday Aug. 5th, after having sent the letter to you, I was in the Geographical Society, where Ehrenberg introduced me. Here I met a young Mr. Dieffenbach, who has been in New Zealand and other parts of the southern hemisphere. The same evening he had delivered for inspection an entire volume of drawings which were very interesting. One could see from them that the inhabitants of New Zealand are handsome people, like the inhabitants of the South Sea Islands, from whom they are descended according to their own legends. A meal was served after the meeting. I was Ehrenberg's guest and had Dieffenbach on my other side. While we were eating, the ancient and now quite decrepit Professor of Economy Hoffmann came over to me.

He is almost blind so that Ehrenberg had to lead him; he is also hard of hearing, but he said that even though he must be regarded as dead, he had to make my acquaintance. The scene was very touching. Zeune also came very amiably to meet me and declared himself most satisfied with the Scandinavian Society of Natural Scientists.

I spent Sunday the 6th with farewell visits. The most interesting was at Karsten's. I discussed agricultural and forestry institutes with this well-informed practician. He said that they all accomplished very little but cost a great deal and wasted much effort. He expressed himself even more strongly about this than I had expected and extended his assertion to include mining schools, road- and bridge-building schools etc. He said that all these various practicians should have their preliminary education in schools but learn the theory that they otherwise need at the universities. However, they should learn practice in the businesses themselves. Here, where they have a mining school that accomplishes nothing, he has arranged matters so that the mining students who are to become civil servants must first have been to school long enough to be able to attend university. They then serve one year in the mining department, are examined to determine if they have benefited from what they have seen there and are then referred to university in order to continue in mathematics, chemistry, mechanical engineering etc. Only then do they start their career as civil servants. One can easily see that he had to approve of the arrangement of our forestry education when I told him about it. It pleased me to be in such agreement with a man who deserves so much confidence. – Another visit on the same day was also interesting for me. I visited the old Mrs. Herz, one of the few acquaintances that I still have left from 1801. It is well known that she is both learned and witty, and that in earlier years she saw in her house almost all esteemed scientists and artists and all distinguished foreigners. She was perhaps the most important woman in Berlin, but she has now shrunk with age. She recently had the misfortune to fall down a high flight of stairs from the second floor and break a knob on the banister, but she herself escaped with only minor injuries. She enquired after Sibbern and asked to be remembered to him. She also enquired after Oehlenschlager and asked to be remembered to him. Before I went to Mrs. Herz, I vis-

ited Muhr's widow, who had already sent her two children to see me. She had gone out to the Berlin deer park in the area where Mrs. Herz lives. In the hope of being able to meet her on the way, I brought her eldest son along, and we did indeed meet her. The poor woman is deaf as a post, but fortunately, I had paper and pencil with me so that I could write. Much was also accomplished with signs. In the evening I was with Weiss, who read many poems by Chamisso and some by Herweg very well. He likes Chamisso better than I do. However, I do not deny that much of what he read to me was excellent, but as far as I know Chamisso, he tends too much to see things from the dark side. As a poet, this is his right, and he is often excellent at it; but I do not find myself inclined to buy this poet's collected works, even though they can be had quite inexpensively, because I do not want to have a friend of sorrow as one of my daily companions. I shall have to look more into his poems to see if a flourishing zest for life might not also be expressed in them frequently and hold the sorrowful in balance; for if this was not lacking, the work certainly deserved to be read often. Herweg really has a large and lively enthusiasm and is a true poet, but he has a practical goal. This is far from a criticism of him as it is great and noble; but when I read all these invitations to fight for freedom expressed with a vitality that must inspire the young, and I imagine the fight made real and waged victoriously, I shudder to contemplate the little hope we dare have that this hard-fought freedom would be well used; whereas the benefits that are brought about, and even have been brought about during the last generation, by calmly progressing improvements are lasting acquisitions, which, among other things, also have the virtue of quietly displacing the abuses whose violent abolishment is often short-lived. Neither do I believe that all these poetic invitations would have effective consequences so long as people do not believe that governments will retreat.

I shall leave Berlin Thursday the 10th. Last Monday I was invited to the Royal Table in Potsdam and the ancient play **Medea**[18]. The day was pleasant enough in itself but cost me one of the days I wanted to use in Berlin so that I had to add a day. I have continued my scien-

18. Greek tragedy (431 BC) by Euripedes.

tific diary until today; you will receive the continuation of the present letter from Leipzig or Dresden. If I should be detained in Dresden in spite of all my efforts, I cannot leave here until Saturday the 19th and shall then return in the morning of August 21st. However, I shall delay only in the event that important reasons demand it.

Love to all our dear ones. I miss you and all of them.
Your
H. C. Ørsted.

Leipzig, August 1843

Dearest Gitte,
You see from the head of this letter that I am now in Leipzig, where I arrived yesterday evening, and now, on the morning of the 11th, I write to you. However, before I tell you anything from here, I must return to Berlin and complete my journal from there. On Monday the 7th I was invited to the Royal Table and then to see a play in the Court theatre, all in Potsdam. I travelled there as usual on the railway. The carriages, which are drawn by the locomotive, are divided into 3 classes at different prices. The price in first class has recently been raised, which people are very unhappy about, and they have agreed to travel second class. I would otherwise not be ashamed of choosing this, but as I was going to the Royal Table and could travel thus attired in first class, I did so. The saving on travelling second class is not very large; for the 4 miles one pays a little less than 1 Rbd. But I tell you all this only to say that the tacit agreement which people have made recently to travel second class means that one meets almost none but the finest people in first class. This time I met a Prince Witgenstein, who is the King's Chief Lord-in-Waiting. After we had talked a little, he asked if my name was not Ørsted, whereupon I naturally had to ask him his. I saw him later at Court. He is decrepit and had to lean on a stick wherever he walked and stood in the royal halls. – At the railway station I met the philologist Boeck, with whom I later drove to the palace. Since there was time, I first went to Captain Reinhardt, who was very pleased to see me. This time the Royal Table was not held at *Sans Souci* but at **Neuschloss**, where the play was also given later. The Table was held at 2 o'clock, like last time. Both the King and the Queen spoke with me,

but the conversation, as is normal on such occasions, was insignificant. He asked how the stay in Berlin had pleased me. I answered in the most perfect agreement with the truth that it had been most pleasant. I particularly stressed how instructive it had been and spoke of the great increase in all scientific aids over the course of time and especially during his reign. With great delicacy, he conferred most credit upon his forebears. This was actually true, since the founding of the University and many of the most important scientific institutions in Berlin were due to the previous King. When I mentioned how instructive my stay in Berlin was, he said that it was Berlin that profited from me. You can easily imagine that I did not allow this exaggeration to pass unanswered as not only modesty but also truth demanded. The purpose of my reply was to emphasise the many things that the Berlin scientists, also in recent times, have contributed to the enrichment of science. At table I sat between our Count Yoldi and Boeck. After the meal the King spoke with a few groups of guests. I was standing next to Boeck and close to someone whose name I did not learn. Several amusing anecdotes were told as I could tell from the King's laughter; but I did not really understand them due to a lack of knowledge about the circumstances, and Boeck fared no better, but I did hear one original word from the King. They were speaking about some land which had been ruined by a number of poor measures; he said "man hatte es **zermaasregelt**"[19]. One cannot deny that this is really a witty word. After this audience, which was already over by 4 o'clock, Boeck and I in the company of a mining councillor Nöggerath, who was also at the Royal Table, had to spend some time in a room at a nearby coffee-house until the play began. I got to hear a great many anecdotes about Aug. Wilh. Schlegel's incomparable vanity, especially with regard to titles, nobility and decorations. It would be an insult to call him professor, but Herr von Schlegel would be right. – The play which we were to see was **Euripedes'** *Medea*, translated into German by a Mr. **Dorner**. The theatre is in the palace. All the tickets were issued by invitation. The theatre is small but beautiful and superbly lighted. One could say that the audience for the most part

19. Literally: One has regulated it to pieces.

consisted of the most distinguished men in Berlin and their families. The men who sat closest to me were Schelling, Weiss, Boeck, Ries, Magnus, Henr. Rose. I do not recall more near me; but wherever one looked, one saw more distinguished and well-known men than one should expect to find gathered in such a small space. Among the ladies, Bettina was also brought to my notice, but she sat so far from me that I could not really make out her features. The tragedy is one of the most horrible one can imagine and not free of some sophistries, but one cannot deny that the poet has known how to keep us in continuous suspense and prevented us from being repulsed by the gruesome. That a mother should murder her own children in order to revenge herself on her husband for infidelity is certainly contrary to general human nature, but this horror can be regarded as a degeneration originating from it. She is not Greek but from a barbaric people for whom pride and revenge mean everything. She has already offended against the holiest ties of blood before she left the land of her birth for the sake of her husband; the entire legend portrays her as the most uncivilized criminal imaginable. Without wanting to defend the play against the complaints of the critics, I will only say that the repulsiveness of the heroine does not prevent us from enjoying the beauty of the play. The acting was also good, only strict critics would find much to complain about. – I travelled home on the steam-carriage, which, however, did not leave until 11 o'clock even though the play was finished at 9 ¼. Schelling, Meierbeer and a singer Mme Werner, as well as many strangers, were in the same carriage as I. I had the company of Mitscherlich from the station home. As the distance is about ¼ mile, this is always pleasant.

My general journal will be shorter for Tuesday the 8th as the greater part of the day's contents goes into the scientific journal. By appointment I went to Steffens at 9 o'clock in the morning and had a long conversation with him, which he wanted. He talked to me quite spontaneously about my work on the beautiful in physics[20],

20. *An Investigation of Light with Regard to the Physics of Beauty* (1842), KM II, pp. 506-08 and JJK, pp. 599-600 and *Continued Reflections on Light with Regard to the Physics of Beauty* (1843), KM II, pp. 508-10 and JJK, pp. 601-02.

the first sheet of which I had sent him through a traveller. He spoke about it with great approval and said that I had begun the investigation just as he would have begun his but had not been able to carry it out to his liking, that is, to develop the thoughts, based on experience, that were to be the object of the investigation. He praised the work for its exceptional conciseness and clarity and encouraged me to complete it soon. Even though this is a lot of praise, I must, as a diarist, write about it on this occasion. He also spoke a great deal about the philosophical works which he is doing now, and which he wishes to give all the clarity and perfection that he can. Among these is one on psychology. He will go to Rügen this summer to have peace and quiet for his work. I send many regards from his wife and daughter. – I went from him to Ries, who showed me some new experiments, and later to Mitscherlich, who also showed me many interesting things. I then went with him to his country house, where I was invited to dinner, and where I met Schelling, Boeck, Link, Johannes Müller, Kunowsky (a competent jurist who is also an astronomer) and others. Before dinner I spoke with Mitscherlich about forestry institutes and agricultural institutes, and he quite agreed with me. What really convinces me that he did not agree with me merely out of politeness is that he is having his two sons, whom he wants to place as cameralists, educated so that they will be sent to a landowner after their schooling, and afterwards he will have them study the necessary theoretical subjects in Berlin, after which they will once again return for additional practical training. As Mitscherlich is a very wise man, his example carries significant authority.

Wednesday the 9th was mostly spent on farewell visits and on appointments; however, I saw Engineer Baumann's workshop and was able to see how he makes exact copies of measuring rods according to Bessel's precepts. To see this was part of the completion of my plans in Berlin. – In the evening I was with Weiss.

On Thursday the 10th I departed on the steam-carriage. I had been informed that it was to leave at 11 o'clock, but it did not leave until 12. On the first part of the journey until Luckau, a factory town with 6000 inhabitants, I was in a part of the carriage where there was only one other passenger. He told me that he had an estate 1½

miles from Luckau. Almost all the way we talked about national economic and historical subjects and parted greatly satisfied with each other's company. I spent another stage alone and was not bored either, but later two merchants came in, one of which described some business speculations with much stridency and indignation. Their company, which did not allow me to pursue my own thoughts or inform me of anything coherent, bored me. Travelling by steam-carriage is quite tiring; one is shaken quite a lot. On this route there are many brief stops, particularly in Anhalt, which thus fits its name. At about 7 o'clock we arrived in Leipzig, where Wilh. Weber awaited me in the station and invited me to stay with him. I accepted the offer. His abode is quite small and old-fashioned, but he will soon get a better abode. He is a bachelor but has his mother and a sister with him as well as a younger brother. In the evening both his brothers, Erdmann, the chemist Lehmann were at Wilh. Weber's.

Next day, Friday the 11th, he showed me his more recent experiments. Then the anatomist Weber came to fetch me and took me to Schwegerken, an old Parisian acquaintance from 1812. He is professor of botany and lives at the botanical gardens, which are very large. Leipzig has become much beautified and enlarged in recent times. The former fortifications are now very beautiful promenades. The health of the city is much improved as a result. W. Weber had invited several to dinner, including the chemist Erdmann, the astronomer Moebius, the physiologist Folkmann, the chemist Marchand from Halle.

[The following paragraph has been added in the margin:] I cannot omit telling you that the chemist Erdmann told me that my **Ansichten der chemischen Naturgesetze**, which was published in 1812, had been the book that convinced him to choose chemistry because he saw in it for the first time that chemistry is a true science. However, I can only see this as his then having been at a stage of development where a book with a scientific spirit can have an inspiring effect.

In the evening we went to tea with the anatomist Weber, who is a very witty and well-informed man. Here I saw Carus, a well-known doctor, who soon left, Kyhne, a professor of chemistry who cannot

get on with the other chemist Erdmann, who has a much more favourable post. This Kyhne is said to be of no great importance. The mineralogist Naumann was also there. He has been in Freiberg but is now a professor in Leipzig. He has been in Scandinavia and speaks good Danish, which can hardly be ascribed to this stay alone; but his father, the composer Naumann, lived for some years in Copenhagen and married a Danish girl so that this Naumann's mother tongue really is Danish. He praised Forchhammer's geognostic works highly. I was also pleased to hear all the chemists here speak highly of Scharling's work. Schwegerken was also here and a chemist Weinlich.

On my walk this morning I had seen Gellert's Monument by Oeser. Gellert's portrait is at the base and is said to be very lifelike. An urn stands above and weeping children express their pain. In that connection Weber, the anatomist, read a beautiful little poem by Goethe about this monument. I shall look for it in his works when I come home. He also read some of Lessing's juvenile letters, which have recently been published, and which show how early he had established his German style.

Today, Saturday the 12th, I have arrived in Dresden. I did come by the railway but not very rapidly because the train was a packet service. Still, we travelled the 13 miles in 5 ½ hours. Wilh. Weber has accompanied me. We are staying at the *Englischer Hof*. I shall stay here Sunday, Monday, Tuesday, Wednesday, leave for Berlin on Thursday, stay there on Friday, travel to Stralsund on Saturday, and leave for Copenhagen on Sunday, where I can be expected early in the morning. – I have already seen Professor Seebeck here, who has invited me for Monday evening. He does not know that it is my birthday.

I continue on the 14th. Yesterday the 13th I called on the astronomer Lindenau, who is also a minister, but did not meet him. On the other hand, I did meet Dahl and saw there an excellent depiction of the Norwegian church which the King of Prussia bought; also the throne that **Sverre** used, and that Dahl has purchased at a very low price. Dahl is to fetch me this morning at 9 o'clock and take me to the picture gallery. – I now return to yesterday. I ate dinner at a very beautiful public place which stands on a high and extensive terrace

along the Elbe[21]. Weber and Seebeck were my guests. At table we had a long conversation about academic conditions and about the disparity between the demands to speak and write in Latin and the spirit of the times. Weber related that when they finally decided to accept German treatises in the proceedings of the Göttingen Society, the famous philologist Ottfried Müller was one of the first to do so and found it more convenient to write in German than in Latin. He declared that thesis defences (at German universities) were pure comedies, where objections and responses were agreed upon in advance, even read aloud from notes. I am sure it is different with us; but most people must still prepare for their defence with friends or hired teachers, who then serve as a kind of Latin language teacher and have the exercises deal with the topic that is to be argued. However, this is also close to being a game played with the learning to which such great importance is still attached. – After the meal we drove out to the surroundings of Dresden and visited the **Finlay** Garden[22], established by a Lord Finlay, who has immortalised himself with similar establishments at several other places. He dared not return to England because of a most scandalous depravity. From the garden there is a beautiful view all the way to the Bohemian mountains. We drove from there along a road that offered innumerable beautiful variations, through the village of Löschewitz, just across from which lies the Blasewitz, from which Gustel in Schiller's Wallenstein[23] came. Our route took us farther to a magnificently situated little royal summer palace, which stands on a considerable elevation, and from which one has the broadest views. Everything here is arranged with much taste and extremely well-maintained. After our return we had a visited from a Dr. Kohlschütter and a Baron Walthershausen. The latter has performed great and meritorious work on Ætna, where he has stayed for a long time. He is also known for his magnetic observations.

21. *Brühl's Terrace.* Count Heinrich von Brühl (1700-63) built a palace here in 1737. The terrace was opened to the public in 1814.

22. Findlater's Vineyard, a beautiful landscape garden established (from 1805) by James Ogilvy, 7th Earl of Findlater. His "scandalous depravity" was homosexuality.

23. *Wallensteins Lager* (1799).

Finished at 9 o'clock, August 14th.

A thousand greetings. I shall soon hasten to you, beloved Gitte, and all my loved ones, whom I miss more and more.

Your

H. C. Ørsted.

Berlin, August 18th and 19th 1843

Dearest Gitte,

I continue to write the part of my journal that is not purely scientific as a letter to you even though I shall bring it myself; but I find it easier to write that way. I ended my letter from Dresden on Monday August 14th. I had finished it before I went out in the morning. Dahl came at 9 o'clock and took me to the picture gallery, where he showed me around faithfully. Even though it was 41 years since I had seen it, I recognised many of the excellent paintings. Among these is **Corregio's** *Night*. They have several of his masterpieces here, among them his *Magdalene*, which you know from the beautiful copy that **Oehlenschläger** has. That I immediately come to Corregio lies in the fact that we are both so greatly reminded of him by our friend's tragedy. It would be too much even if I were to name only the greatest masterpieces in this gallery. I saw enough for many days' re-enjoyment. I told Dahl that when looking at **Raphael's** works, I feel a union of spirituality and nature just as I feel with Mozart's music, with which he completely agreed. The gallery is far better arranged than before, but people are still not satisfied with it. They find that most of the excellent paintings are not displayed in the light they deserve. To this must be added that the industrial works have resulted in coal dust in the part of the city where the gallery is. The pictures suffer greatly from this. Therefore, glass has been placed in front of many of the best, but it follows that one sees them poorly. While contemplating such a painting with glass, one sees all the paintings opposite reflected in it. – They also complain that the gallery sometimes has so many visitors that their exhalations damage the paintings. Some claim that many of these disadvantages could be removed by providing good air circulation. – On our walk through the gallery we met many of Dahl's acquaintances, especially many travelling Norwegians. Of Danes, we met *Conferents-*

raad Rist with his family and Baroness Eggers with her daughter. She asked me to which spa I was travelling. When I answered that I had no such goal, she said that she was pleased, for almost all the countrymen she met here were travelling for their health; she was happy to meet one who did not need to. When I came home very tired at about 1 o'clock, I found a visiting card from Dr. v. Holger of Vienna. I immediately ran to the inn where he was staying, walked one and a half times up and down three flights of stone stairs, and then learned that he had gone out.

[The following paragraph has been added in the margin:] After we had eaten dinner at 1-2 o'clock, Weber, Walthershausen and I were fetched by Commissioner Blockmann in order to see a large and excellent device for the boring of water mains of stone, Pirna stone. He even bores stones of a length of 10 feet with an opening of 11 inches in diameter. He had already offered to show it to me through Engineer Weiss and is willing to test our Bornholm stones for us to see if they can be used for that purpose. They could be taken by sea and then up the Elbe. I have made more detailed notes about this.

On the same Monday August 14th, I was invited to an evening party at Seebeck's as I mentioned in my last letter. The party was large, and I met the most amiable courtesy from everybody. An *Ob. Appellationsrat*[24] Hännel had been in Copenhagen and knew my brother, to whom he sent his warmest regards. Professor Hübner, a competent painter, spoke to me about **Thorvaldsen** and sent his regards to him. His expressions were full of gratitude to the great artist. In the party were also two excellent brothers Blockmann. One of them in particular, Commissioner Blockmann, is a true genius at practical mechanics and also has good scientific knowledge, and I talked a good deal more with him about his large device for the boring of Pirna sandstone for water mains in Dresden. It goes without saying that Weber and Walthershausen were at the party. Naturally, I do not remember everyone. The conversation at table was very lively. Towards the conclusion of the meal, when those sitting at the end where Seebeck was seated had been talking about

24. A member of the Court of Appeals in Schleswig.

discoverers and Columbus in particular, Seebeck rose and said: Let us now turn our attention from Columbus and all the other discoverers to the great discoverer of electromagnetism. He now spoke about the consequences of this discovery and finally mentioned that it was my birthday (Weber had told him that). In my response, I spoke about all the hospitality with which I, first as a youth and later during several periods of my life, had been received by Germany's scientists and the love that I had always had for German literature. I then turned the speech to the present company and expressed my thanks. Afterwards I proposed a toast to our host and hostess but dwelt particularly on the fact that Seebeck's famous father had been my friend, and that I had seen with great pleasure that the important work of the son had shown him to be worthy of the father. Both he and his virginally lovely young wife were visibly moved. We had met at 7 o'clock and parted at 11 ½. The day had been both instructive and wonderful, but also extremely tiring; but I am used to that every day. I must be dressed before 8 o'clock here if I am not to be impeded by visits later.

On Monday the 15th[25] Dahl fetched me in order to visit the famous doctor and anatomist Carus, who is also distinguished by his artistic sense. During the summer this man lives alternately in Pilnitz, where the Court is, and in Dresden. He comes to Dresden only every other weekday and has numerous things to do. Therefore our conversation was not long. I brought him regards from Jacobson, which he returned with great interest. When I left there, I visited State Councillor Franke and at the same time had the opportunity to pay my respects to his wife, whom I have seen at Bech's. She enquired with great interest about their health. She also knew **Karen** quite well. I have regards to you and her from Mrs. Franke. – As there is currently an assembly of the States General, I did not want to miss it. In the First Chamber they were still dealing with the encroachment of the Catholic church on the Protestant; but since I had not been there on the first day when this matter was discussed, which is said to have been very interesting, I could not quite follow

25. The 15th was a Tuesday. Added in the margin: That morning Weber and Walthershausen left for Leipzig.

it, especially because some of the speakers did not have the best voices, and because I did not have anyone with me who could tell me who the speakers were. The Second Chamber dealt with a new law related to proprietary rights, but it was too detailed for me. I can only say that the building is impressive, and the assembly rooms are large and high. – I ate dinner at the table d'hôte with v. Holger and a young Viennese, a law student, who accompanies him. They complained a good deal about the state of science in Vienna and everywhere in Austria. Everything is most alarmingly restricted. No-one is allowed to give lectures on any subject unless appointed to do so. Holger published a journal for physics with much self-sacrifice, but as he had only 15 subscribers, he found that this enterprise could not bring forth any scientific fruit of importance and therefore gave it up. In the evening I was in the theatre and saw the Italian opera, *Lucretia Borgia*[26]. The singing was beautiful and won much applause. Blockmann was there and, between two of the acts, showed me around the foyer and the galleries. The theatre is large and beautiful, the galleries around it, like all the rest, are excellently illuminated with a very well-cleaned coal gas from which no smoke could be noticed.

On Wednesday morning (Aug. 16th) I was taken by Seebeck to visit the apothecary Dr. Struve's establishment for the manufacture of artificial mineral water. It lies outside the city and consists of two parts, one where the water is prepared, the second where it is distributed and sometimes drunk. The place has a beautiful garden, where those who take the water can stroll. From there one has a view of part of the battlefield where the Battle of Dresden was fought. The establishment was founded by his father, who was a very ingenious fellow. The son is also a capable man. He assured us that the prejudice which doctors have had against artificial mineral water has disappeared, at least as regards Dresden and its environs. You know that I have always defended artificial mineral water and said that it can often be better than natural. This is also his conviction, and he mentioned to me that last summer, when Germany suffered greatly from drought, most mineral waters had far less carbonic

26. Opera (1833) by Gaetano Donizetti (1797-1848).

acid than they usually have. – That same day at 4 o'clock, I took the steam-carriage to Leipzig, where I arrived at 7 ½ and took lodgings in **Stadt Rom**, which is close to the station, so that I could easily depart for Berlin the next morning. I broke the journey thus on Blockmann's advice because it is quite exhausting. Yet there is a great difference. This complaint is justified for the journey from Dresden to Leipzig and from there to Köthen; from Köthen to Berlin, however, the journey is not so tiring. The carriages are much better there, but whether this is the only reason, or whether the tracks are also better, I cannot say. In Leipzig I had all three brothers Weber and Waltherhausen with me again.

The journey to Berlin on Thurs. the 17th had nothing of interest to offer. The carriage in which I was seated had only one other traveller for most of the time, a Russian officer from Finland, who, as I later saw in the **Fremdenblatt** published here, was called Furnhjelm, which should probably be Turnhjelm. He did not speak German fluently so that we had to speak French. The great differences he had seen in agriculture in England and Belgium compared to the conditions in his fatherland had instilled great enthusiasm in him for this cause. He spoke keenly in favour of an agricultural institute and referred to the examples of England and Belgium, but when it came to further particulars, he was only interested in education and sound theory with good examples. He had not see any agricultural institute. When I asked him about agricultural institutes in Belgium, where he had spent 3 years, he said that they were just starting to establish agricultural institutes there; so excellent cultivation existed before the institutes.

I arrived in Berlin at 2 o'clock, changed, ate, enquired at Weiss' residence, where I learned that he and his wife have left, as I expected. I read and wrote at home.

Yesterday, Fri. the 18th, I accomplished all kinds of errands still remaining, read and wrote at home, but in the evening a terrifying but magnificent spectacle presented itself to the entire city. The Opera burned. It is not far from the Meinhardt Hotel, where I am staying. It was quiet. The University building, the Academy, the museum etc. were extremely brightly illuminated. From Unter den Linden one could most comfortably and undisturbedly see most of

it. I did not remain outside for long as the falling sparks were very large. The ladies in the hotel were in great fear and had all their belongings moved to the ground floor. Among these ladies was the wife of Councillor of State Been from Altona, whose husband was not present. She had seen the fire in Hamburg and had been made extremely uneasy by that experience. The thing that caught my attention in particular was the circumstance that the fire was drifting towards the large Royal Library, which is under repair and was surrounded by scaffolding. When I heard that they had had the scaffolding torn down, and that the Opera had collapsed in the meantime, I realized that the danger had passed and went to bed at 12 o'clock, but I said that I should be awakened if matters took an unexpected turn. I had packed my trunk in order to be prepared for everything.

At 4 o'clock I shall leave on the railway to Passow, from there with the express post to Stralsund, and with the Prussian packet-boat to Copenhagen, where I hope to be Monday morning Aug. 21st.

With this I end my journal. I shall tell you the rest. How I am looking forward to that.

Your

H. C. Ørsted.

8.
Journey to Paris, England, and Germany (July - September 1846)

To C. A. Scharling:[1]

Paris, July 29th 1846

Dear Son-in-Law,

As my wife's stay in the country could easily have the result that news from us would reach you and Karen too late, I want to write to you today. You can see from the head that we are now in Paris. Our entire trip has gone very well, and we have seen and enjoyed much in spite of the speed. I have endured the journey quite well, about which I had some doubt beforehand. You will learn the details of the journey from Mathilde's letters to her mother. I shall only mention here that we did not see other friends in Berlin than Weiss, and that they remembered you fondly. In Bonn, Brandis and his family received us in the most friendly manner. In Brussels, Quetelet showed us all possible courtesy. We were taken to many places by him and his family. We met the chemist Stass, who has worked with Dumas. He showed great interest in my earlier works, including my *Recherches sur l'identité des forces électriques et chimiques*, and asked me many questions about my chemical nomenclature[2]. Another professor, Louyet, gave me several short papers, which, however, seemed of minor importance. I shall not detain you by speaking about the train to Paris. Everything went well. We arrived in the evening on Sunday the 26th. On Monday we visited our chargé d'affaires and our consul but found neither of them at home; however, in the street

1. It has not been possible to find the original of this letter, which has therefore been reproduced from MØ II, pp. 226-28.

2. *Tentamen nomenclaturæ chemicæ omnibus linguis scandinavico-germanicis communis, prolusiones loco scripsit M. Johannes Christianus Ørsted* (1814), KM II, pp. 178-205.

we met Caroc and his wife, who visited us the same day. We are staying at Rue Richelieu Nr. 47 (*Hotel de Bruxelles*) quite near the Palais Royal. Therefore, we soon seized the opportunity to take a walk in that wonderful collection of boutiques, coffee-houses, restaurants etc. Mathilde was enchanted by it. We then walked through a number of streets and came to the Tuileries, where Forchhammer left us. I had the pleasure of accompanying our two ladies home by the shortest route as I remembered all the relevant streets. Yesterday we visited several scholars but found only a few at home, but we did succeed in seeing Blainville and Chevreul. On the following day, the former was to begin a little trip to the country which is to last the better part of 2 weeks, but he invited us to have lunch with him two weeks from today. Chevreul was also sincerely glad to see me. He has a summer residence and wants all four of us to come out and see him next week. He has a son who has recently married a lady from Guizot's family[3]. Today we met Biot. He looks very old but has all his youthful liveliness.

I shall not detain you by talking about our visits to the Jardin des Plantes, the Place de la Bastille, the boulevards etc. However, I must relate that, on the evening of the 29th, we were present at the celebration in the Tuileries Gardens[4] and had such good seats that we could easily see the King and the Royal Family. The concert was of no importance; on the other hand, the illumination and the fireworks were beautiful. During the concert a bang was heard. I took it for a signal, but others claimed that a shot had been fired at the King. Only conflicting reports were available last evening, but this morning (the 30th) the necessary details may be found in the papers. This very moment I am told that the shot really was an attempted murder. The criminal has been caught, is called Charles Henry[5], a worker who was by no means driven to the deed by poverty but had 140 francs in his pocket. The King immediately made

3. Henri Nicolas Chevreul (1819-89), married 1846 to Marie Charlotte Joséphine Languet de Sivry (1826-1900).

4. This celebration was in honour of the July Revolution of 1830, which brought King Louis Philippe to power.

5. Joseph Henry.

a movement when the shot was heard. I connected this with the presumed signal, but I now see that he has pointed to the place from which the shot came and then shown that no harm had been done. – There were frequent shouts of *vive le Roi* but with very few voices.

I see that I must close now. Give my love to Karen and all the children, and to my brother, to whom I shall not write today, and his household. I also ask you to convey my warmest regards to your brother, the professor[6], and to your other brothers.
Ever your
H. C. Ørsted.

To Inger Birgitte Ørsted:

Paris, July 30th 1846

Dear Gitte,
I can no longer be satisfied with allowing you to receive all the reports of our journey from Mathilde even though she writes such detailed letters that I believe I can be brief. You now have news from us until we went out last evening to hear the concert and to see the illumination and the fireworks in the Tuileries Gardens. The concert was of no importance but the illumination and the fireworks beautiful. I would not have dwelled on this if we had not experienced the remarkable event that the King was shot at. We had seats almost under the balcony where the King and Royal Family sat. We heard a bang, but I took it for a signal; but we immediately saw the King stretch out his arm and point to the place from which the shot had come, besides which he showed through gestures that no harm had been done. The criminal was called Charles Henry, a mechanical labourer who is said to have had lived unhappily with his family. The celebration continued without interruption, and the King and the Royal Family did not retire until late.

The few friends that I have been able to find at home have received me most warmly. Among these, I mention **Chevreul, Blain-**

6. Carl Emil Scharling (1803-77), theologian and professor at the University of Copenhagen.

ville, Biot. I shall meet many of the others this week or on Monday at the Institute.

On the journey I have quite often had cause to think about you, dear Gitte. In several of the most beautiful spots, where we were most pleased, I wished that you were with us, but I must admit that I did not wish you to be on such a hurried journey; it would have tired you entirely too much. However, could I once take you to the Saxon Switzerland, which we have not visited this time, but which I know from earlier times, it would give me great pleasure.

Receive my fondest love, and give my warmest regards to Anders, Nikolay, Hasle, Maria, Sophia.
Ever your
H. C. Ørsted

Letters that are sent before Aug. 8th should be sent to Rue Richelieu, No. 47, *hôtel de Bruxelles*.

Paris, Aug. 10th 1846

Dear Gitte,
As Mathilde writes to you in such detail, you will again receive only a short letter. You can easily imagine that we hasten to make use of Paris; however, we suffer long delays from the long distances even though we frequently use carriages, from the difficulty of finding people at home, from appointments at times that are not always respected as precisely as could be wished. However, we have already seen much and are still seeing more. I have been ill on a couple of the hottest days, yet have only stayed at home one day; but there were several days when I felt weak and ill suited for anything. My indisposition consisted only in an insignificant colic, but the weakness was the worst. Many other people felt ill from the heat during the same days.

I receive here every proof of kindness that I could wish. One thing that struck me as something unusual here was that, when I visited a big examination at the *école centrale des Arts et métiers*, where all the examiners received me with the usual French politeness towards foreign scholars, I was greeted upon my departure by all the students that I met on the stairs.

Gaymard has shown us much courtesy. Brongniart and Thenard have had us to dinner in the country. I would tell you something about these interesting parties if I did not anticipate that Mathilde would mention them. She is a great success here. Her French is much praised, and Brongniart noticed immediately that she had a taste for painting when he showed us the magnificent paintings that the Sevres Factory has made on porcelain. She has now many splendid opportunities to acquire even greater skills in French.

Give my regards to Anders and thank him for his letter. Tell Nikolai that when I hear how useful her French is to Mathilde, I have thought that it would be a genuine benefit for him to try to pronounce it as well as possible while he is reading for the examination; and ask him above all to keep in mind that there are now only a few months more than a year until he takes the exam. Love to Karen and Scharling, Sophie and Dahlström, Marie and Hasle. Many regards to my brother from me and to his entire household and to other good friends.

The warmest love to yourself from
Your
H. C. Ørsted

Paris, August 19th 1846

Dear Gitte,
You receive a letter from Paris again today. We have not been able to set the day of our departure until last evening because the French King's travels and other business had not permitted any appointment of the day when we were to be presented to him, but we could hardly retreat after having requested to be presented. The Danish chargé d'affaires Baron Brockdorff finally came to us last evening and informed us that we were to be presented Saturday evening. We shall then leave Sunday morning.

I shall not tell you what you can see from Mathilde's letters home but first tell you how we have arranged things so that showing her and Mrs. Forchhammer around in Paris would not take from us the time that we owe to scientific goals. It is [almost] the procedure that we had planned in advance. We had the opportunity ourselves to take them several times to the painting and sculpture gallery, once

to Versailles and St. Cloud, to the Pantheon, a couple of times to the Jardin de Plantes, but otherwise Doctor Brandes, Levy, Gaymard have taken them to many places when we did not have the time to go. I have already mentioned the scholars I saw during the first days of my visit and their kind reception. I shall not enumerate those I have met since; they have been entered in my diary, partly along with the contents of our conversations. I shall tell you what may interest you when I come home. Forchhammer and I are in unceasing activity for our scientific goals and go to bed exhausted every evening, but we sleep well at night and are cheerful again every morning.

A week ago today we were at **Chevreul's** country house about one mile from our hotel. The place is called Lahay but is pronounced Laï. He possesses a large property in that neighbourhood and has an unusually large garden, which he has arranged completely according to his own views of grouping and colours. The groupings are very beautiful, and the harmony of the colours of the flowers is undoubtedly very beautiful in spring and autumn, when there are many flowers. The choice of trees is such that harmonious colours of flowers come at the same time. There were not many guests. The party consisted almost entirely of his wife, her mother and sister, two brothers-in-law and the anatomist Coste. The ladies received Mrs. Forchhammer and Mathilde extremely well. Chevreul took Forchhammer and me up to his room for about an hour and read us some chemical philosophy, which was written with great thoroughness and clarity. Chevreul has a son who has recently married a niece of Guizot, but who was absent. We enjoyed ourselves immensely. It has given me great pleasure to hear later from Chevreul that both he and his ladies have taken a great fancy to Mathilde. – I was with him again in Paris a few days ago. He lives in the Jardin de Plantes. He read something to me again and told me with much amiable confidence about his situation. He is very rich and gave his son 250,000 francs, approximately one hundred thousand rix-dollars, when he married and still has a considerable fortune left.

In roaming through Paris for my scientific goals I have had the opportunity to notice how very rapidly it is expanding. The buildings which concern the sciences have naturally attracted my atten-

tion, but they are no exception from the others. They have erected a large new building, much larger than our university building, in order to give the *école normale* more room. This school is the place where young scientists are educated as teachers in the schools. In this new institution they have been given ample opportunity to practice chemistry and physics, which are an important part of school instruction here. In order to expand the *Conservatoire des arts et métiers*, where they give lectures to craftsmen, manufacturers etc., and where one has the opportunity to see a rich collection of models, they have granted 1,400,000 francs, that is: more than ½ million rix-dollars. – One sees many similar improvements. The large Royal Library is soon to get a new building. – I have seen many parts of the enormous fortifications that surround Paris. They bear the impress of strength and have cost several hundred millions.

I now make a leap from the very large to the very small. On the journey here the enormous amount of dust forced me to assume a black stock. This has won so much praise from our little party of travellers that I must wear it daily. The matter will eventually by subject to your judgement.

I enclose a letter to Holten, and in it is one to Colding. I want Holten to receive his letter immediately. Should he, against all expectations, be absent for several days, Colding must be requested to read them both.

Love to all our dear ones and especially to you from
Your
H. C. Ørsted

French scholars send many regards to Scharling.

London, Aug. 28th 1846

Dear Gitte,
Even though we must sigh for letters from Copenhagen here, I shall not repay ill with ill but let you hear from me. Since Mathilde will tell you about our journey to London and about our stay here so far, I shall tell you about the last days in Paris, during which there were many things in which she did not participate. On Wednesday evening Aug. 19th I was with **Guizot**. He received me with the great-

est courtesy, but since he had to divide his attention among so many in the large party, there could not be much time for each of them. Forchhammer was there and enjoyed the same good reception. There we saw Duke Decazes, who presented us to the Prefect of the Seine, Count Rambuteau. He offered to show us the *Hôtel de Ville* (city hall) and permitted us to bring our ladies. Our *chargé d'affaires*, who took us to Guizot, also presented us to the Minister of Education, Count Salvandy, to whom I already had an invitation through Chevreul, but now Forchhammer was also invited, which pleased me greatly. All this took place in the greatest haste. We were there for scarcely ½ hour. The Crown Prince of Bavaria[7] was there without my noticing it. One stays only for a short time at these evening visits, and a proper Parisian makes several in one evening.

We dined with Salvandy the next day. We were invited for 6 o'clock, arrived a quarter of an hour after that but did not sit down to dinner until after 7. We saw many remarkable men there: the Duke of Isly (better known under the name of General Bugeaud), Sauzet, who has been the president of the Chamber of Deputies for a number of years, the Duke of Broglie, Count Rambuteau, the Spaniards Martinez de las Rosas and Miraflores; finally I shall mention the one who will interest you the most, Victor Hugo. He sat close to me, only Chevreul sat between him and me and introduced me to him. He expressed himself with great courtesy, and I did not neglect to tell him how much we Danes admire him, and that it would always be a precious memory to have met him. The time and place did not permit any conversation of significance; moreover, Chevreul took up most of the time explaining to Victor Hugo his theory about the juxtaposition of colours with regard to beauty. This theory is in fundamental agreement with **Göthe's**, which I also embrace, but Chevreul has enriched it with beautiful experiences and peculiar remarks.

On Friday the 21st we visited the *Hôtel de Ville*, probably the most remarkable city hall in the world. It is hardly an exaggeration to say that it is 10 times larger than ours and also has an entirely different significance. One part of the building is old, but in the last 8 or 9

7. Maximilian II (1811-64), King of Bavaria 1848-64.

years they have made very large additions but with such insight and taste that the old constitutes a suitable element in the whole. We presented ourselves in a very large hall, probably more than 50 *alen* long, where Count Rambuteau came and took us around himself. This hall is of great historical interest. In its time the League assembled here until Henry IV[8] defeated it. Later the Fronde assembled here. It was here that the majority of the great events of the Revolution had their focus. In most Danish translations this city hall is called **Stadshuset**, and that is perhaps appropriate since it is different from our city hall in so many ways[9]. Louis Philippe was first presented as the people's king from the balcony of this hall. It would be far too much to describe all the rest in this letter. I shall only mention that it is not only the council of the city that assembles here but many other public commissions and boards. Some rooms are designated for examinations. The building contains huge halls for public celebrations. Among the halls designated for business meetings, which are also beautifully equipped, it is possible to combine many into one when they are to be used for large celebrations. A roof can be raised over the court-yard itself, and 6000 (six thousand) people can eat at the largest celebrations here. Above, there are enormously extensive archives that seem to be in excellent order. There was one division where they kept maps of all the streets and all the houses in Paris, arranged in a very clear manner. Among the protocols, one was opened for us, in which the signatures of Robespierre and the other revolutionaries figured prominently. Count Rambuteau also showed us his own living quarters, which were quite worthy of a high official but very modest in comparison with the splendour of the large halls where he is host on public occasions. Finally, he showed us the garden for his personal use, which is very beautiful and has good greenhouses. He showed himself to be acquainted with botany. In the garden he took some pretty flowers and gave them to Mrs. Forchhammer and Mathilde.

8. Henri IV (1553-1610), French king.

9. The Danish word "Stadshus" is equivalent to "Hôtel de Ville"; the conventional Danish term "rådhus" means "house of the council".

Not only this building but the entire city owes this man a great deal. The city has more than 20 million Rbd in our currency in revenues, and these are used in part for large beautifications that provide employment for craftsmen and artists. With regard to the Hôtel de Ville, many artists, craftsmen and manufacturers have shown such eagerness to display their work there that they have performed their work merely for the expenses they had themselves. I felt genuine admiration for the man who, for so many years, has managed such great things with such excellent competence and good fortune, and I did not neglect to express this to him. He answered my thanks by saying that he had been delighted to show the esteem he had so long had for my name by taking me around here himself; and in truth it was a very tangible courtesy for a man who has an administration that can be compared to a small kingdom.

On Saturday the 22nd we were finally presented to the King. It was one of the very few days when he was in Paris during this time. At first, the King thought that he was speaking with my brother, so he had not been properly informed by the introducer. He then spoke about his stay in Scandinavia with great pleasure. The Queen, the King's sister and the Princess of Naples sat at a round work table with several ladies-in-waiting. We were presented to each of the three noble ladies, who spoke a few words to each of us. This mostly concerned our stay in Paris, whether we had been there before, etc. We spoke with a good conscience about the many beautifications which Paris has received. We were also presented to the Duke of Aumale, a handsome young prince. Basically, all such presentations at court are insignificant in themselves, but it is still interesting to have seen such remarkable people and such a remarkable court, the King above all.

Love to all our dear ones and especially to you from
Your
H. C. Ørsted

A note to Holten is enclosed. It is very important for me to get the requested papers from him.

Travel journal:

Journey 1846[10]

On Thursday July 16th at 4 o'clock in the afternoon I left Copenhagen together with Mathilde, Forchhammer and Mrs. Forchhammer on the steam-ship Geyser. Among the other passengers I can mention Dean Ahrens from Norway, who was matriculated in 1806 by the examination deputation of which I was a member. Dean Kaurin from Norway, Pastor Schütte from Bregentved, who accompanied a young Count Moltke, Baron Hamilton from Sweden, the authoress from Knorring and her husband, Baron Schoulz von Ascherade etc. We arrived at Stettin the next day (Friday the 17th) somewhat after 12 o'clock. The steam-carriage did not leave until 4 ½, and we did not arrive in Berlin until after 9 o'clock. Already at 9 ½ I visited **Weiss**, who was very pleased with the visit, and it was agreed that on the following day (Saturday the 18th) we would all come there at 8 o'clock and stay with them for as long as we could. Forchhammer and I drove out to Humboldt but did not find him. The bell pull had been removed, and an address was given on the door where one could deliver letters and visiting cards. Weiss lives excellently. We visited the mineral collection, which adjoins his residence and is magnificently arranged. We then took a drive through some of the most beautiful parts of the city, out at one gate, through a small part of the deer park, and in at the Brandenburg Gate. We now hastened to complete our packing (Residence: *Hôtel de Petersbourg*) and arrived at the station before 1 o'clock.

Sat. the 18th. At about 8 o'clock in the evening, we arrived at Halle, where we visited Professor Marchand after it had already become quite late. He accompanied us home and visited us early the next morning (Sunday the 19th). So, too, Dr. Wolff, the chemist. At 9 o'clock the train departed for Weissenfels. We took a hired coach

10. HCØ was accompanied on this journey by his daughter Mathilde, who was responsible for family correspondence except for the few letters to IBØ given above. We have therefore elected to include his travel journal, that includes both personal and scientific/technical notes. Some of the technical notes are characterised by frequent deletions and marginal notes.

from Weissenfels and came via Naumburg and Weimar to Erfurt, where we lodged in the *Gasthof zum Kaiser*. We saw many beautiful places along the way. In Weissenfels we had lunch at the inn *zum Schützen*, where we saw portraits of Gustavus Adolphus and Wallenstein, which hang there to commemorate the fact that Wallenstein had stayed there before the Battle of Lützen, and that Gustavus Adolphus was brought dead to the town (although not to this house) the day after the battle. A fellow traveller, a Lieutenant v. Voss, an adjutant, showed himself to be most informative and enlightened.

Mond. the 20th. The following day we travelled through Gotha, Eisenach etc. with the intention of reaching Fulda, but we were detained too long in Gotha and did not get farther than Butlar, a village with a good inn, which has an excellent location. The evening was beautiful, and for the first hour after our arrival, we could still enjoy the view. On our departure from Gotha we had the opportunity to see Wartburg from several sides as the road in this mountainous area turns frequently. We had many magnificent views along this road. Further on the road to Butlar we saw a magnificent area near Kösen, in which there is also a salt mine with an evaporation works, which hardly beautified the area but did not stand out so visibly long enough to spoil it.

Tuesday the 21st. From Butlar we continued our way through Fulda and Hanau to Frankfurt. We were dealing with Hessian conditions here. I have never seen such shameless tolls anywhere. Several times I predicted that a new toll had to be paid even though we had paid only a few moments before, but my joke turned out to be the serious truth even though I did not expected it at all. They also have there the curious arrangement that those who collect the toll do not come out to the carriage but either extend a pouch on a pole from the window or cause the coachman to get down to bring it.

Wednesday the 22nd. The following day we left Frankfurt and went on the railway to Birberich and from there with steam-ship down the Rhine. This day was also beautiful, though cloudy from time to time. The beautiful banks that one sees here are well known and are easily recalled to memory with the aid of the useful maps of

the Rhine. The **Loreley**, which is famous for its many echoes, gave only a poor echo of some feeble puffs from the ship. It was claimed that the proper echo could only be obtained on land. We came to Bonn in the evening and visited Brandis. He was not there at first, but his wife received us with the greatest kindness, and Dietrich Brandis was immensely pleased with our arrival. Father and son accompanied us home, and we agreed that the young Brandis should accompany us on the railway to **Kölln** the next day.

On Thurs. the 23rd we came to Kölln. Brandis immediately had our things transported to the station from which we were to depart later. We visited the famous cathedral. Its interior makes a particularly great impression. The high pillars of this church, which are as composed of many stems, the high vaults thus formed, the harmony of the parts, the painted windows, the illumination so suitable for the character of the building, all this and much more has so often been described that I shall not attempt to repeat it. I feel in complete agreement with the common opinion that the impression is great and solemn. We also climbed the exterior, where one enjoys magnificent expansive views and gets to see the artistic details with which the church has been built. One can only admire the spirit that has encompassed the full concept of this building. If, on the other hand, we regard the construction of the building as a human endeavour, one dare say that it is too grand. The whole church has now been under construction for more than 600 years, and yet not half of it has been finished. The choir is more or less finished. The lower parts of the two intended high towers have been built, and the lower part of the nave. If one sees this incomplete building at a fairly large distance of a few thousand paces, it looks ugly and flimsy, which would probably not be the case if it had been finished; for if one looks at the finished parts from the outside at such a distance that one does not see the incompleteness, the impression is also one of beauty. In recent years they have begun to build again, as is well known, and it appears that they have studied the plan of the building with great insight. It is also worth noticing that the new stonemason work, the new glass paintings show that we are fully able to do the work, partly as well and partly even better than before. But they calculate that this great work will not be finished for 30 years,

if one assumes a strong level of support, greater than what it has had in most of the past. While one admires both the greatness and the beauty in such enterprises, one ought not, as is usually the case, let the praise that one accords to those times when they were begun be unmixed. At that time they were really guilty of the mistake of starting enterprises that completely exceeded the powers of the state or the people, that is to say: They were imprudent. The construction of the choir alone took more than 70 years. The church still stands incomplete after 600 years, and if it is ever completed, this will be far less due to the religious idea from which it sprang than to the love of art of a more recent time, united with a passing return to or rather retention of the taste of those times. This desire to begin something so big that it exceeded their powers is characteristic of a lower level of development and is precisely found very frequently repeated in church buildings of the Middle Ages. The great church of Strassburg, one of the most perfect of its kind, still has only one of the two intended towers. The Notre Dame church in Paris has only the lower half of the towers; the spires are still lacking. One finds examples of this kind in many Gothic churches, which gives them a stumpy appearance. St. Peter's church in Rome was completed, but by means that broke the power of the Roman church; namely the ridiculous sale of indulgences. This enterprise was more the fruit of a splendour- and art-loving than a religious spirit.

[The following paragraph has been added separately:] To wish to build in our times according to the principles of the Middle Ages is imprudent. In all the works of the Middle Ages there is a certain dominant subtlety, due to their awakening insight. Their philosophy was dominated by a subtlety which was often admirable, but which would not have brought forth the same works if thought had been appropriately strengthened by experience. The chivalry of the Middle Ages and its *cours d'amour* were true models of subtlety. Court ceremonial is no less a creation of the same kind. Naturally, the word **subtlety** is only an imperfect expression of the matter, but it is perhaps the most useful of all those available. It is apparently not the consequence of pure thought, but it rather arises when imagination takes perspicacity into its service. Gothic architecture is for me

a vivid picture of this subtlety, which can give us something that, in its best works, belongs to the finest creations of the human spirit. Therefore, I usually permit all sorts of works of the Middle Ages to make their valid impression on me, but I usually say to my fellow man: Do not allow yourself to be taken in by the admiration they engender to demand their resurrection. The works of the Middle Ages are works of another period of Nature. The one in which we find ourselves is the rational return to Nature united with a mighty use of Nature. Our time has not yet discovered its art, except for a few individual examples such as excellent and thereby also beautiful bridges, superbly built machines etc. Let it have the time to develop; it will, as a consequence of the laws of the development of the world.

Thursd. the 23rd. We left the city after having eaten at a place on the other side of the Rhine, where a bridge crosses it, and travelled by the railway to Achen and from there to Lütti[ch], where we spent the night.

On Friday the 24th we came to Brussels in the morning. I immediately visited Quetelet, who received me with great kindness. I was first turned away with the message that he was not at home, but as soon as he had received my visiting card, he had a messenger bring me back. He showed me his astronomical, magnetic, and meteorological observatory. He has 4 assistants who relieve one another so that observations are made both day and night. – At the inn Mathilde and I attended the table d'hôte, which was long and boring and awkward because of the noise of crockery. – At 7 o'clock in the evening Quetelet came with his son, a young officer, and showed us around the city. As is well known, it is very fine and has been greatly and beautifully expanded in recent times. The square where the city hall stands was particularly remarkable for us. This building itself is very beautiful, most certainly built long before the decline of the Netherlands. Just opposite is the building where Egmont and Horn[11] were forced to mount the scaffold. Executions still take place here in the square. The buildings in this square belong primarily to

11. Lamoral, Count of Egmont (1522-68) and Philip de Montmorency, Count of Hoorn (1524-68) were beheaded on June 5, 1568 on the Grand-Place in Brussels.

various guilds, and each has its own style. I returned home quite tired at 9 ½ . The heat of the day, the journey in the morning, the long distances had all contributed to this.

Saturd. the 25th. We ate lunch with Quetelet. (Before that I paid a visit to Coopmann.) Before lunch we met with Stass, Louyet and others there. One of the gentlemen present wrote to Paris for us and obtained lodgings at the *Hôtel de Bruxelles, rue Richelieu.* After lunch they joined us in the botanical gardens, which are beautiful and large, but where we were detained rather too long in the greenhouses. We were then taken to the armoury, a collection of physical instruments, large and rich both in old things as well as new, a collection of paintings, which was quite insignificant. Shortly after our return, Forchhammer and his wife arrived in Brussels. They had left us in Aachen so that F. could visit the region around Maastricht. We took them both around the city a little in the evening and prepared ourselves to depart the next day for Paris.

On Sund. the 26th we travelled on the railway to Paris without anything unusual happening to us. We were detained much more than an hour for customs examination and were left with the unreasonably short time of only ¼ hour for dinner so that we had to take a roast chicken with us in the carriage and tear it to pieces as best we could.

On Mond. the 27th we visited the Danish chargé d'affaires Baron Brockdorff and Gen. Cons. Delong, neither of whom we found at home. Brockdorff has no fixed time when he can be found, Dulong does. Outside Brockdorff's residence we met Caroc and his wife, who came to see us the same day. We made ourselves comfortable after the tiring journey and visited the Palais Royal as well as part of the Tuilleries. Naturally, the many new things which hereby present themselves always make a great impression, especially on those who see them for the first time; in particular, it made a great impression on Mathilde.

Tuesd. the 28th. We (Forch. and I) paid many visits today but found very few people at home. We did meet Blainville, who received us most kindly. He recalled all kinds of little things from our earlier intercourse and told us when we could meet Chevreul. As he was to leave the next day, he invited us for lunch two weeks later.

We met with a no less amiable reception at Chevreul's. He has a deep friendship for me. He showed us his most recent work on the sheen and iridescence of fabrics, which I already knew, but he was tireless in showing us all the details. We were with him in the afternoon. Mrs. Forchhammer and Mathilde were in the Jardin de Plantes, where he lives, but had to wait a very long time for us.

On Wed. the 29th we paid many visits in the morning but met no-one. The day is treated so completely as a holiday that not even the post office was open. We received visits from several Danes, including Haxthausen, who wanted me to come to the Scandinavian Society in Paris. I said that I would have to consider it, as I first had to satisfy myself that the Society had no political purpose, and that I, in spite of my Scandinavian feelings, had kept away from the Scand. Soc. founded in Copenhagen only because it would not acknowledge the principle, insisted on by some, of not engaging in political activities. In the evening, we went to the celebration in the Tuillerie Gardens, to which our landlord had obtained admission cards for us. We had very good seats almost under the balcony where the King and the Royal Family were. We heard the shot that was aimed at the King and saw the movement of his arm with which he pointed to the place from which the shot had come; but the concert and the other festivities continued with so little disruption that one remained in doubt as to whether some signal had been given, or whether an attack had really taken place. There were frequent cries of Long live the King but only a few voices. The illumination and the fireworks were very beautiful, the concert rather insignificant.

Thursd. the 30th. We visited Biot. He found me quite unchanged, I cannot say the same about him. He carries the marks of old age, one can say of decrepitude, to an extent that I have rarely seen before; however, he still speaks with great liveliness. We had visits from Pelouse, Brandes (from Cph.), Svanberg, visited the museum and, in the afternoon, *l'Arc de l'étoile*, which made a great impression on us.

On Frid. the 31st we visited the Jardin de Plantes with our ladies. While they looked at the animals, accompanied by Forchhammer, I visited Flourens, who received me with great honour. He speaks well but is too full of compliments. For the rest of the day I increas-

ingly felt the consequences of the many days of continuous heat and the exertions that I had exposed myself to.

On Saturd. August 1st I stayed at home due to my indisposition, which was greatly reduced as a consequence.

On Sund. August 2nd we visited St. Cloud and Versa[i]lles. We went to St. Cloud by steam-ship down the Seine. We departed from Pont Royal. It was a very beautiful little trip. We enjoyed a very beautiful view from the garden at St. Cloud. However, we had intermittent showers. We had admission to the castle by a card from the Gen. Consul. It is splendid and decorated with great taste. The views are magnificent. It is rich in superb paintings. – At Versailles, we saw as much of the enormous historic collection of paintings as we could in that short time. We restricted ourselves mostly to Horace Vernet's magnificent works and thus got the impression of something great and extraordinary. We then saw the fountains, which were all in action today (*les grandes eaux*), which only occurs a few times each year. They are in truth splendid and have a great variety. All, or almost all, new fountains in Paris and Versailles are characterized by the great power with which the water is forced through relatively small openings so that it is spread into countless drops even as it rises. – The crowd for the train was horribly large and unpleasant.

On Monday Aug. 3rd I paid several visits and was in the Ac. des Sc. from 3 to 5. In the evening we went to the *Cimetière du Père de la Chaise*, but when we arrived, we found it closed, which occurs at 7 o'clock. We then went to the *Barrière du Trône*[12] and from there into the city. We saw nothing of particular beauty along the way.

On Tuesd. Aug. 4th we visited Gaymard, who received us with great courtesy. – In the evening in the *Opéra comique* (*The Queen's Musketeers*)[13]. The play is famous, but it seemed somewhat long to us.

Wed. Aug. 5th. We visited the *Sorbonne*, the *École Normale* and the collection of phys. instruments at the *Conservatoire des arts et métiers*.

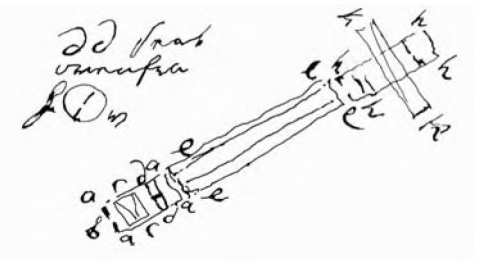
12. Barrière du Trône, Parisian city gate, built in 1787, now Place de la Nation.

13. *Les mousquetaires de la reine* (1846), comic opera in 3 acts by Jacques Fromental Halévy (1799-1862) with a libretto by Jules Henri Vernoy de Saint-Georges (1799-1875).

Regnault's assistant Bertin showed us his apparatus for the compression of water. It is arranged so that he can exert pressure only on the water in the flask, only outside it, or both together. Lamé has calculated formulas for this. I asked Bertin if he would suggest to Regnault, as a *contre-épreuve*, to compress solid bodies following my method. He promised this and even believed that he could do it before Regnault's return. The *École Normale* is being expanded on a large scale, and much is being done to give them an education in the natural sciences. One gives them the opportunity to experiment and to practice experimentation and teaches them something about turning and glass blowing. – We then visited Deloeuil, who showed us an excellent balance, for which he charges 10,000 francs. Silbermann showed us around in the *Conservatoire des Arts et Métiers*. Charles' instruments are still here and the lists of his listeners. Among other things, I saw Silbermann's heliostat, which is really excellent in its great simplicity. In the evening we saw the triumphal arch, the *Arc de l'Etoile*, which we contemplated with great pleasure!

Thursd. August 6th. We ate dinner at Sèvres with Brongniart. We saw there magnificent porcelain copies of famous paintings. The intensity of the colours is much greater than in the originals and has the advantage of being imperishable. We also saw works of glass painting, which far surpass anything that one has seen elsewhere. As is well known, the state supports this factory at considerable expense, but this is not wasted; for it constitutes a teaching institution not only for all other porcelain factories but also for all kinds of potteries, primarily in France and then more broadly.

Frid. August 7th. Visited Soleil. I saw his optical saccharimeter. *aaaa* is a tube that has an opening at *E*. *cc* is a prism of calc-spar,



achromatized by two glass prisms, one of crown-glass and one of flint-glass, everything arranged so that one ray passes through it colourless. *dd* is a plate composed of two halves, one of which rotates the polarization plane of the light to the right, the other to the left. *eeee* is a tube of thick glass, surrounded by a brass tube, and there are two well-ground glass plates at the ends. *hhhh* is a [tube]. *gg* is a thin quartz plate that rotates the polarization plane to the left; *kk* is a plate cut for two prisms that rotate the polarization plane to the right (naturally, *gg* could rotate to the right and *kk* to the left). By pushing the two prisms more or less over one another, one creates a plate that neutralizes the effect of *hh* or whatever thickness one wishes. With a measuring scale one learns the thickness of the plate that *kk* creates in the given position. One places it first so that one sees two identically coloured images when the intermediate tube is removed. The scale is now set to zero. The prisms must be adjusted differently when the sugar solution is introduced. If one, for example, obtains 6.12, it means that the sugar solution corresponds to a quartz plate of 6.12 millimetres thickness. Warming the sugar solution with hydrogen chloride gives a great change. In this case one adds 2/20 of liquid and then has a tube of 22 centim. in addition to one of 20 centim. There is a telescope of the Galilean type at *hh*, which increases the clarity significantly.

In addition to the saccharimeter, I took an improved Nürnberg polariscope from Soleil. We also saw there an apparatus for measuring the angle between crystal axes, which Forchh. will undoubtedly take. – We later visited the *école centrale des arts et métiers*, where a big examination was being held. The candidates first prepare a long technical dissertation, e.g. the plan for a bridge, a factory, or the like. 35 days are given for this task. They are now being examined with particular regard to this. The oral examination is very formal. All the examiners or at least a majority of them are present for the entire time. One saw Payen, Pictet, Mary, Peligot and others there. – The candidate we heard this time was weak. – Those candidates who perform satisfactorily receive a diploma as *Ingénieur civil*. Those who are less satisfactory in some respects receive a certificate for their proficiency; those who are even worse do not. Then we went to the *Conservatoire des arts et métiers* accompanied by Peligot, and there

we saw the very comprehensive collection of models. – In the evening we went on a little outing to Auteuil, where our ladies rode on donkeys.

Saturd. August 8th. I had received a letter from Baroness Poisson that she wanted to give me [some dissertations] for the Royal Society. I visited her and was most politely received and got the dissertations. Earlier in the morning, I had a visit from Abbé Moigno, who publishes a couple of journals, understands many languages etc. He offered me every possible service. I visited the *école centrale* again today. The two candidates I heard were not very strong. One of them did not seem to be able to explain the principles used in his dissertation. I took the opportunity today to speak with Mary (the director of the water department), who promised to talk to me after the examination period. He said that he had not yet tested Chameroi's pipes for 7 years and was not certain that they would withstand oxidation at the joints. He only coats the cast iron pipes on the inside with a little linseed oil varnish. Because of frost, he is concerned about taking the water high up in houses, even here in Paris. In the evening Gaymard took us to the circus, where we saw equestrian artistry and the like. Most of the things we saw here I have seen equally good in Copenhagen; however, I did see one unusual trick, which consisted in one of the people standing on a rolling barrel and moving as it rolled, even up a ramp.

Sund. August 9th. In the morning we saw the Royal Apartments in the Palais Royal, where, among other things, there are some beautiful paintings. In the afternoon Mathilde and I went to **Diner** with Thenard at his country house Fontenay aux Roses. We drove in a miserable coach or omnibus. We had Chevreul and Beudant with us. Thenard and Mme Thenard received us in the most friendly manner. Mme Th. is still very beautiful for a woman of forty-odd years. At Thenard's request we arrived at 4 o'clock, but many of the guests did not come until well after 6 o'clock. Among the guests were Serres, Balard, Pelouse.

Mond. Aug. 10th. The Abbé Moigno took me to Froment. Forchhammer and Brandes came along. M. also brought a Dr. Höfer from Vienna. An engineer Clarke from the railway was also there. Froment has an excellent magneto-electric machine, which he uses

to turn a machine with which one winds copper wire. He also uses it to perform other tasks in the workshop. Naturally, it functions without noise. He had many other beautiful machines, but after having seen them, I decided to return to him once more when there are not so many other people buzzing about me. I later went to the Institute, where things were rather sleepy.

Tuesd. Aug. 11th. In the morning Gaymard took me to be daguerreotyped by Sabathier-Blau. The address was left for Forchhammer, who was not at home. Sabathier places the subject in an device that forces him to sit leaning somewhat forward, and the hands must be held so that they are at about the same distance as the head. He spread something white over all those parts of the face where the skin had turned yellow because these would otherwise become dark spots. His instrument has a mirror that gives the picture the true orientation. In recent years, he has made more than 4000 daguerreotype portraits annually, that is, an average of 11 each day. I sat for him for 25 seconds. The day was cloudy. Afterwards I went for the second time to Soleil, who again showed me his instruments with a kind of merciless expansiveness; however, it was not completely useless this time. Among other things, he showed me a collection of instruments for showing all optical experiments that belong in a darkened room in lamp light. But he demanded the unreasonable price of one thousand francs. I am not at all certain that it would be worth having this apparatus. At Gaymard's request, I then sat for the painter Kietz and was fetched by Gaymard, who took us all to the hippodrome, which is a beautiful equestrian spectacle. In the evening Forch. and I spent a long time in the Palais Royal with Wrede and his young wife.

Wed. August 12th. In the morning I had a visit from Delong and was accompanied by him to several boutiques. Later I was with Mrs. Forch. and Mathilde at a ceremony where prizes were given to students. We had poor seats because we arrived only ½ hour before the beginning. There one saw the professors in an old-fashioned ceremonial procession. Guizot was there in a plain black robe. Salvandy was there as Minister of Education. First there was a speech in Latin, which lasted ½ hour and was delivered very skilfully. Salvandy, who had come from Algeria the night before, could not read

his speech properly. He was standing in a poorly illuminated place. The number of those who had received prizes was very large. Everyone who had received first-class honours stepped up to the Minister, was embraced by him with a kiss on each cheek, and received a prize of books. A fanfare was played with every prize. The students applauded for almost every prize, and if the fanfare was forgotten, they demanded it. The names of those who had received honourable mention were also read and accompanied by applause. Mathilde thought that we should introduce something like this at home, but I doubt that it agrees with our national character. It would be good if we could make our graduations more ceremonious. Among other things, it would be good to have a genuine reward to be received in public. – After that we went to Chevreul at his country house *L'haÿe* (read Laï). He has a very large garden, which he has arranged according to his own principles of taste. It is really very beautiful. The groupings made a magnificent impression. In spring and autumn, when many trees are in bloom, the colour combinations would also make a beautiful impression. The only guest was a Mr. Coste, who has distinguished himself with work in embryology. Chevreul took us for a while to his own room and read something to us from his treatise on science which was of a very philosophical character. I would have to read it myself in order to judge it properly.

Thursd. Aug. 13th. I visited Froment and ordered from him an electromagnetic machine that can set a pump in motion and turn a plate, the latter for optical and acoustical applications. There is also the possibility that the apparatus can pull a cart up a ramp. He claimed that the purity of the iron was particularly important for obtaining a large effect, and that a small but powerful instrument thus became expensive. He also regarded the purity of the copper wires as important. We ate lunch, Forchh. and I, with Blainville. Only his assistant was in the party, which was very high-spirited. I went from there to Kietz, where Gaymard also came.

Frid. Aug. 14th. I paid an early visit to Chevreul, where I remained from 10 ½ until 1 ½. He read something to me in which he defended the older view of salts against the new; he also expatiated in a very friendly manner on his personal situation and was apprised of mine. He assured me that Mathilde had made an uncommonly

favourable impression in his house. Thénard assured me of the same recently. During my visit Chevreul had numerous matters to attend to. Meanwhile, I took the 32nd volume of *Annales de Ch. & de Phys.*, in which I re-read with pleasure Arago's polemic in connection with his experiments on the magnetism of motion. – I had to sit again for Kietz for almost two hours. We carried on a lively conversation the whole time, mostly about the state of human society in times past and present. Forchh. and I had invited Levy and Brandes for dinner. Our party took place in a room at the *Caffé Corrazza*.

Saturd. August 15th. I visited Mary, engineer of bridges and roads (Rue Madame 30, bis), who gave me information about the waterworks in Paris. The water in the fountains all comes from the Canal de l'ourque, which is 9 meters higher than the surface of the Seine. This water is led through a long brick aqueduct until it is distributed. – There is as yet no public filtration system. A commission, including Mary and Arago and 4 others, is investigating the best method. Forviel's filter (of sponge and sand), which was strongly recommended by Arago, has been produced by a company which has gone bankrupt as a consequence. Tard uses chopped hemp and carbon. Souchon uses clumps of wool, which he has also called wool clippings. They are trying these three methods, but the last seems to be the best.

He gave me the following information about Chaméroy's pipes. They are now coated inside and outside with a lead alloy made of tin and lead. Thereby the sheet iron becomes more ductile. The pipes must be riveted together. Chameroy's pipes are quite excellent for gas. Mary claimed that they did not cause even one thousandth of the gas losses (*fuites*) of cast iron. For gas, the interior of the pipes must not be coated with mastic (as it is called) but only the exterior. For water, however, they must also be coated internally. He has left such coated pipes for a long time in water with a weak excess of acid without their being attacked. Chameroy's water mains were first used for the Austerlitz Bridge, which shakes when carriages cross it, and which therefore would not tolerate cast iron pipes. These were initially used; the pipes were soldered without flanges, and many repairs were required; later everything has gone well. As he only has 8 years of experience, he does not yet dare to

introduce **Chameroy**'s pipes everywhere in the waterworks; so far only 7 to 8 thousand meters have been used in the waterworks here, but if they continue to pass the test, their use will be great. Otherwise pipes of cast iron are used. No particular distinction is made between the different kinds, but the softer ones are avoided as they are more easily attacked. Tests are conducted with 10 atmospheres of pressure. For his previous remarks, see S. 18[14].

Afterwards, I went to Soleil and saw an instrument for creating the effects of the solar microscope with the aid of a **Bunsen** cell. It is described in Pouillet's physics book[15] and yields quite excellent images according to what he assured me today. It comes to 550 francs. Soleil is working on a much improved version of Biot's apparatus for the use of circular polarization. Soleil's saccharimeter works only for sugar solutions because rock crystal and sugar have the same refraction.

I visited Dumas, who had recently returned home, and found with him Matteucci, who will take me to Breguet tomorrow. Mrs. Dumas was also there. He advised me to go via Havre and up the Thames to London.

I also visited Flourens, whose courtesy is much too eloquent. He gave me two memorial articles, one for Du-Pet-Thouars [Du Petit-Thouars] and one for Decandolle [de Candolle]. I promised him my obituary for Jacobson.

I completed my morning visits with Peligot and Pouillet. The latter is working on a new edition of his physics book. I promised him my experiments on the heat generated by the compression of water[16] for it.

In the evening a trip to Neuilly. We came past the chapel built on the spot where le Duc d'Orleans[17] lost his life, but it had already closed at 5 o'clock. A woman sold small medallions, which were

14. This edition, p. 441.

15. *Éléments de physique expérimentale et de météorologie*, first edition 1827, seventh edition 1856.

16. *An Account of Experiments on the Heat Generated by the Compression of Water* (1845), KM II, pp. 527-9 and JJK, pp. 607-09.

17. Ferdinand Louis Philippe Charles Henri (1810-42), Duke of Orléans, son of Louis Philippe.

beautiful. I bought one for 2 francs and one for 5 sous. One could not promenade in the garden at Neuilly because the Prince is staying at the castle. Afterward we walked in the Bois de Boulogne.

Sund. August 16th. Matteucci took me to Breguet (grandson of the famous one). He showed me an electromagnetic telegraph, where the signals are precisely the same as in the old telegraphs. He believed that this would be better because of its simplicity, and because one can combine the same symbols with the most different dictionaries so that only the principals can read the message. He had a magneto-electric machine, where the wires are wound around the magnetic yoke itself, and the armature, which is rotated close in front of it, is extremely light. One can thus give it a far greater speed without requiring greater strength in the machine parts. He had converted his grandfather's metal thermometer into a recording thermometer. At the end of the spiral is hung a magnetic needle which, through a piece of glass, moves another magnetic needle, which is the indicator. At one end, the latter is fitted with a small ink container with a down-turned ink tube, directly under which is a piece of paper that is moved by a clock. Over the same end of the indicator is a light brass spring that, at certain intervals given by the clock, presses the tube of the ink container against the paper and forms dots that indicate the temperature. – **Breguet** exerts no more care in his choice of iron for his magnets than by using Swedish iron.

Later we all visited the Pantheon and inspected it carefully. It also has underground vaults with columns that suit it with their powerful simplicity. There one sees Voltaire's and Rousseau's sepulchres, Marshal Lannes's (Mo[n]tebello) and in some sections a number of senators and generals from the time of the Empire in less imposing graves placed very close together. One can see here, after this practice has ceased, that it would be desirable that no-one was chosen for the Pantheon until 50 years after his death. The interior of the over-ground part merits its wide-spread fame. It is very beautiful. We also visited the interior of the upper part to see the paintings in the dome and the exterior to enjoy the wide view.

Mond. Aug. 17th. I went again to Soleil. I decided to take the instrument for showing the effects of the solar microscope with the

aid of the Bunsen galv. light. It is important to note that the glowing point is not always located at the same spot so that it is necessary to move the plate with the lenses accordingly. The result is that one cannot use it for all the prismatic and the related interference experiments for which it could otherwise serve. It occurs to me at this moment that one could possibly move the concave mirror, which reflects the light to the lens, together with the lens. I also ordered an instrument with two mounted tourmalines between which a crystal can be placed.

Oberhauser explained to me that the principal thing about his most perfect microscopes is the position of the focus of the illuminating mirror with respect to the object that is to be viewed and its perfect centering. The glass which he puts in the less expensive ones are equally good. I ordered two of his microscopes at 100 francs, one for the Metropolitan School[18] and one for the collection.

I then went to Bunten, who does not make any Walferdin thermometers. He showed me his own maximum thermometer of the following arrangement:

It is a spirit thermometer with the upper part drawn out into a very fine tube, which is surrounded by a container. All the spirits that run out during heating are caught in the container; so even years later it is possible to see what the highest temperature has been during that period.

Later I went to the Institute, where I saw Desprez, and where the antiquarian Letronne also came to me. After the meeting I had a

18. School in Copenhagen founded in 1209 as the cathedral school; was named Metropolitan School in 1817.

long conversation with Dumas about Levy. I repeated the advice that I had previously given to Levy, to get a pharmacy in Copenhagen. I said that he would easily obtain a dispensation for only having received H. ill.[19] in his pharmaceutical examination.

On leaving the Institute, I met Gloekener from *The Lion*. He has had the misfortune of losing 3 children out of 4 in a very short time.

In the evening in the Scandinavian Society, where we met Haxthausen, the language teacher Möller, the dean from Roskilde, the doctors Jensen and Ravn, the journeyman watchmaker Weldschiötz, a *Kammerjunker*[20] Sehsted and others.

Tuesd. Aug. 18th. Today we saw galvanic plating with gold and silver on a large scale at Chrisoph's, Faubourg St. Martin. As it did not at all smell of cyanogen, F. and I had the suspicion that the lye was not a cyanogen solution, but the chemist there assured us that this was only due to the addition of iron cyanide salt. One saw there many gold- and silver-plated objects for the Royal table and kitchen. The Royal coat of arms was on them. The procedure is as follows: 1) the surface is cleaned (*decaper*) 2) the objects are submerged in large vats with lye, across which lie copper rods, from which the objects are hung on copper wires 3) the gold- and silver-plated objects are taken up now and then and tested with a copper brush to see the adherence and the quality of the coating 4) they are then treated with copper brushes, either by machine or by hand depending on circumstances, and always with water with a little beer in it 5) they are then coloured 6) and then polished with a burnisher of steel or polished hard stone (*Brunissoir*). It is so common to provide spoons and forks together that one has to make the most precise inquiries to find the price of each separately; one dozen silver-plated forks come to 39 francs, spoons also; but it seems doubtful to me to use the latter in our households, for as soon as some of the metal composition is bared, our wine soups could dissolve some of the base metal.

F. and I then went to Chameroy. Among other things he gave us the information that the change in the length of the pipes with a

19. Haud illaudabilis = not unworthy of praise (second grade).

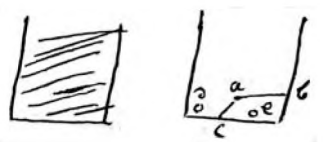
20. Originally an official, ranking below *Kammerherre*, with access to the King's chambers; now honorary.

change in temperature is rendered harmless by screwing them together because the small clearance provides sufficient space for the change in each individual pipe. He is going to show us his factory and the laying of the pipes.

Baron Brockdorff finally came to us in the evening and told us that the King would receive us on Saturday evening.

Wednesd. Aug. 19th. Gaymard took us to see the tapestries. It is undeniably interesting to see how closely weaving can approximate painting. If Tyre and Sidon had had anything like it, it would have been a thing of wonder for the ancients. But in reality, it is a very painful and slow method of making copies of paintings, which still lose the freshness of their beautiful colours in the course of time. Porcelain has a great advantage in this regard. – In the evening we were taken by Baron Brockdorff to Guizot, who received us with great courtesy, but the conversation had to be brief and insignificant given the nature of the party. We saw there Duke Decazes, who presented us to Count Rambuteau, the Prefect of the Seine, who offered to show us the Hôtel de Ville. Brockdorff presented us to Salvandy, who had already, through Chevreul, invited me to dinner on the following day. He now invited Forchh. and Brockdorff as well. The Crown Prince of Bavaria was also there but soon left so that I did not notice him. All this took place in the greatest haste. I do not believe that we were there for ½ hour, perhaps even less.

Thursd. Aug. 20th. Forchhammer and I saw a shop for filters such as are commonly used in Parisian houses. They are very simple and consist of a square box of limestone, usually 2 feet long, 1 foot wide and 2 ½ feet high. The measurements are given by estimate and from memory. The filter stone itself is a very porous sandstone which is quite thin, hardly more than ½ inch. The figure here shows the arrangement. *ab* and *ac* are the filter stones, *d* and *e* are taps. The filtered water is drawn from *e*, the unfiltered from *d*. At home one



would have to try to replace the sandstone with porous plates of burnt clay. Perhaps one could also use inverted cylinders. It is presumably the nature of sandstone that requires the use of plates. The filter would then look something like this.

One uses only iron filings and vinegar for putty in the Parisian filters.

We then visited Chameroy's factory. The iron is cut with appropriately designed shears and then given a metallic coating. The surface is first cleaned in a sulphuric acid bath, thereupon coated with ammonia, and is then pulled through a metallic bath that consists of lead, tin and bismuth and has a temperature such that the ammonia evaporates quickly. The superfluous metal is wiped off, and the entire plate has its metal coating. Naturally, the warmer the bath, the thinner the coating. The cut plates are then bent. The narrower ones are first prepared with a preliminary less extreme bending. The bending is performed on a cylinder, as a mandrel, and with the aid of the pressure of two rollers from the outside. Holes are hammered with a special machine at the edges that are to be joined, one in each edge at the same time, so that they correspond perfectly. Then the edges are joined by riveting with nails of very soft iron which have the same metal coating as the pipes. The heads of these nails turn inwards, but the points are hit with a piston from the outside to make another head. Hereafter, the pipes are soldered so that they become tight. The screws with which the pipes are joined are made of the same metal as the coating. F. has taken samples to see if this is strictly so. The screws are made by casting. We saw an interior screw being made. The pipe, which has previously been made a little wider with the edge bent outward at one end, is placed vertically with the wide end up. One then places, at an appropriate depth, some barrier that prevents the metal from running too far down. In the

narrower pipes this is a clay plug, in the wider ones a metal plate with three small outward-going wings by means of which it can be pushed against the pipe with a screw. The plug or the barrier is covered with sand. In the pipe they now insert a cylinder with an external screw, around which the internal screw is to be made. But this cylinder is composed of several pieces so that it can easily be removed later. It consists of a cylindrical ring, made of several pieces, an inner cylinder of wood as a barrier, and an outer ring to hold it together. As far as I remember, there was sand between the wood cylinder and the spindle. When the poured molten metal has hardened, most of the sand is removed, and the parts of the inner cylinder are separated from one another with hammers. The contact edge of the metal with the bent edge of the pipe is finished off with a soldering iron, and its adherence is increased with a flux of zinc chloride. The external screws are cast in a similar manner. The pipes are now coated with a tar, actually turpentine and pitch (F. thought he had heard coal tar), which adheres well, and wrapped still warm with thin cord in corkscrew windings which have a separation of a few fingers. The base has now been established for the thicker outer coating of asphalt, pitch and wax (F. has understood asphalt, resin, and tallow). This is poured on to a heated table with edges, dusted with crushed stone, and then the pipe is turned in it. As far as I remember, there were two such tables so that the pipe was taken from one to the other. Thereafter, they are rolled on a wooden drum with a diameter of approximately 3 feet, which is rotated about a horizontal axis, and stands in water. The coating is thus rounded and cooled. – **Before the coating is done**, every pipe is tested with a pressure of 10 atmospheres.

We then went to a point on the Canal de l'ourque where pipes were being laid for the removal of sewage water. The Canal de l'ourque, outside the Barrier de la villette, is quite high, and most of its water is used for fountains. It is evidently very dirty. The pipes that were laid here had a smooth inner coating like all Chameroy's water pipes. It is said that no filth attaches itself in them. The pipes that were laid were something more than 1 ½ times a man's height. We saw them being screwed together. The foreman stood by the screws. The pipe was supported at both ends by iron chains, but at

a couple of places in the middle of the pipe the rotation was done by means of a device that consisted of a wooden pole with a rope sling. The pole was pushed so that it tightened the sling and was itself pressed against the pipe. The pipe was rotated by the motion of this lever. I did not really watch the time, but I believe that this was completed within ¼ hour. In order to make bends, which must be slight for each joining, one cuts the end of the pipes at the female screw at an angle but arranges the screw so that it has its axis parallel to the next pipe. When laying narrow pipes, only 3 men are required, for wider ones 4 to 5. We saw 5 men employed.

F. and I had dinner with Salvandy. The party was large. We saw the Duke of Isly, Martinez de las Rojas, Victor Hugo, Count Rambuteau, Sauzet, Miraflores, the Duke of Broglio. I sat between Chevreul and Brockdorff, but Victor Hugo sat next to Chevreul. The latter introduced me to him, and the usual compliments were exchanged, but time and place did not permit a more extensive conversation. Chevreul, who sat closer to him, gave him a long lecture about his colour theory.

Frid. Aug. 21st 1846. Today we visited the City Hall. Count Rambuteau, the Prefect of the Seine, had invited us there the day before yesterday. I sent in my card. He was not immediately available; in the meanwhile we waited in a large and magnificent hall, which according to a little pacing must be more than 50 *alen* long and a little more than 20 wide. It seemed to us a little too long compared to its width. However, we did not wait long before the Prefect came. He gave us some details about the hall. It is of great historic interest. In its time, the League assembled here, later the Fronde. During the Revolution some of the most remarkable assemblies that are said to have occurred at the City Hall took place here. Many important events have been announced from its balcony, both at the time of the Empire and later. It was here that Lafitte presented Louis Philippe as King. The oldest part of the building is ancient and was continued in 1549 after a long interruption following the drawings of Dominique Cortone. It was completed in the year 1603 by Henry IV. But since 1837 the building has been vastly expanded so that the old building only constitutes a small part of the whole. They have kept the new building in the so-called Renaissance style, in which

the old one was built. The construction has been carried out with great magnificence, worthy of a city that has a revenue of 60 million francs, which is more than many a small monarch[21]. The building seems to have been done with uncommon insight and taste. Artists have contributed greatly to its beautification by offering their works at a low price. Painters have created paintings for the beautification of the halls for the same price for which it could otherwise merely be decorated. Mirrors of the **greatest** size have been delivered for the price which they cost the maker. Two such mirrors directly opposite one another had created an almost magical effect. We saw woven upholstery, where a portion of the pattern consisted of glass threads that provided a silvery sheen which cannot be tarnished; these had also been supplied at manufacturing cost. This spirit ought to serve as a model to us. – Many of the large halls in which various gatherings are held can be joined to form one, or at least be connected. One hall, where they hold dinners for up to 60 people or a few more, can easily be made to provide room for 100. There are often much larger dinners, with as many as 6000, obviously in many rooms. Even the inner court can be covered and used as a hall. – The stairways are beautiful and magnificent.

The uses of the big rooms in the building are extremely varied. Naturally, the city council meets here. The hall for this is very beautiful and dignified. Among other business, a number of examinations are held here, e.g. some of the entrance examinations for the polytechnic school and for the central school. As far as I remember, the Prefect said that there were 484 office functionaries. He showed us an office where there were maps of all the streets and all the houses in Paris. The maps were rolled up, and there was a small but very deep square space for each of them so that one could see the end of every map. They were numbered and naturally connected with protocols, which were also shown to us. This, however, is only part of the archival system. There is an archive where all marriages for the last 3 centuries are registered, as well as births and deaths. How much better this is than referring people to the church registers, which should perhaps not be eliminated as they might serve as con-

21. The word "monarch" has been deleted and replaced by "state".

firmation in dubious cases, and if there were some great accident with the main archive, which, however, is most unlikely in the case of the Hôtel de Ville, due to the way it was built. – It would be impossible for me to describe all the archival arrangements that are to be found here; I shall only mention that the crown lands have an archive of their own.

We saw the protocols from the time of the Revolution, in which the signatures of **Robespierre, Tallien, Chambon** and many other famous men were shown to us.

Each of the various main parts of this enormous building has its own regulations for the various parts of the administration, and these are kept separate from one another, but together they constitute a whole. (The Hôtel de Ville also has a library of 80 thousand volumes.)

Among the things we saw here were also maps of the city's gas and water supply. The city has been divided among several gas companies, but they are obliged to turn everything over to the city after 17 years for a certain compensation. The city can then use these systems on the basis of the experience they have gained or can perhaps lease them again under what experience has shown them to be the most favourable conditions. The water mains have been greatly expanded in recent times. The completion of the Grenelle well[22] has also contributed to this. We saw a well-devised model of the Grenelle well. It consists of a tall glass tube in which the various layers passed through during the drilling are represented by samples of the drilled material. In addition to the large fountains, Paris has 1680 smaller ones. Large conduits have been built to remove sewage. He mentioned 35 million francs, but I do not know if perhaps the increase in the water mains was included in this. The pipes which Chameroy is now laying to remove sewage should make up 11,000 meters. When I think of the enormous resources that are united here for the welfare of civil society, I cannot but feel the great weight of this governing administration. Here the citizen can find proofs of his birth and marital status and information dealing with every aspect of property

22. As mayor of Paris, Arago initiated this project. Excavation began in 1833, and the well began to spring in 1841 from a depth of 548 meters.

transactions. Everything dealing with order in the city, cleanliness, water supply, illumination, etc. is decreed and administered here. People often complain about bureaucracy, a poorly formed word that is often used as poorly as it is constructed; but how should all this be accomplished without a significant power, arranged in a hierarchy of subordinate levels of authority? I understand that no-one denies this when speaking generally, but in many of the complaints about bureaucracy one feels that the complainant does not have a clear view of the necessary mode of operation. It is self-evident that complaints about genuine misuse should not hereby be rejected, and that the basic principles of freedom should support and permeate it. Defenders of bureaucratic abuses obviously neglect this. Everything here depends on seeing both sides of the matter.

Count Rambuteau also showed us his own residence, which was quite beautiful and impressive, but extremely modest in comparison with the magnificent halls for public banquets and celebrations. He said that the Prefect of Paris must show himself with pomp, but Mr. de Rambuteau does not need to. Finally, he showed us the beautiful garden belonging to the Prefecture, with its greenhouses. It is not large but very rich in flowers. In talking about it, he showed himself to be a botanist. He gave each of the ladies some beautiful flowers. On our departure I told him with complete truth that I had often heard words of praise about the Hôtel de ville, but that it had far exceeded all expectations. "We are," I said, "filled with admiration for all that has been accomplished here, and it must be a great satisfaction for you, Mr. Prefect, to have contributed so much toward showing that your people can be great in peace as in war." He answered that the effects of peace are the most durable. When I thanked him with great warmth, he responded that it had been a pleasure for him to have been able to give me proof of the great esteem in which he had so long held my name. I really have grounds to be flattered about this, for it was a very tangible proof of kindness that one of the highest officials of the state thus showed us around himself and gave us so much instructive information.

I must add as a postscript that one can also find here in the Hôtel de ville numerous examples of the ardour with which the French remember their great men.

Saturd. Aug. 22nd. I was with Arago today. Upon my arrival here I learned that he was absent because of the elections in Perpignan. Upon his return he was ill and did not come to the Institute last Monday. He has dysentery, but yesterday he was in the Chamber of Deputies, where they intended to dispute the validity of his election. He was very friendly and informed me that I have been nominated as one of the 12 foreign members of the Italian Society, which I did not know. He also informed me of an important invention for well-boring. It has been made by a worker, I believe from the region around Perpignan, and they have been able to bore more in 2 weeks than has been bored nearby in 7 months with conventional methods. The main idea of the invention is that the boring rod is hollow and filled with water. Using flexible pipes and a pressure pump, water is forced into it, and all the gravel and small stones from the boring are washed out and forced over the edge of the bore hole. As far as I remember, he mentioned the enormous magnitude of 10 to 12 meters daily that can be bored in this fashion. On Monday he will report this matter at the Institute. We both regretted that we could not see each other more often this time and spoke about many scientific subjects. He claimed that I looked younger than the last time he saw me 23 years ago. I certainly cannot accept this, but on his side he complained about his health in general, which may well be due to his current indisposition. We parted with the most heartfelt wishes to see each other again.

I then saw the collection of instruments at the *Collège de France*. It is beautiful and excellently maintained. The latter is said to be due to the laboratory assistant. He has the key to the collection, and the preparator Silbermann (the brother of the one at the *Conservatoire des arts et métiers*) is not allowed to enter it except in this fellow's presence.

NB: See added page[23].

In the evening Baron Brockdorff took us to the King (F. and me). The Queen, the King's sister, the Princess of Naples, and some other ladies sat at a work table, whereas the King walked around and spoke with people. We met Count Rambuteau, Duke Decazes,

23. This page contains the following paragraph.

Flourens, Cordier and others there. F. and I were presented to the King at the same time. He thought I was my brother and spoke to me about having been the President of the Roskilde Assembly of the States General. Naturally, I told him the true state of affairs, but this seemed to have the effect that he immediately began to speak about his stay in Denmark and Norway. He sprinkled his tale with a few Danish words. We were then presented to the Queen and to the Princesses mentioned above. They asked how long we had been in Paris, whether we had been there before, etc. We naturally talked about the great beautification and expansion that Paris has experienced since we last saw it. We also exchanged a few words with the Duke of Angulème, a rather tall young man with whom the conversation was much like the previous ones. It is in the nature of things that such presentations are rather empty. It is a good thing that we have been able to use the days which this presentation has forced us to add to our stay in Paris so well that we should have stayed even without any other reason.

Sund. Aug. 23rd. At 7 o'clock we left Paris and went to Arras on the railway and from there by coach to Calais. As the railway does not go any farther than to Arras, the procedure is that one takes a seat in a Parisian coach, which is put on the railway and pulled along to Arras. While on the railway, its wheels are removed and only returned when it leaves the railway. Both on the railway and later things were done with great disorder. At the small stops that were made, one could never find out how many minutes it would be; indeed, the conductor of the coach made every possible obstacle to our getting out. He seemed to consider us his prisoners and spoke on all occasions as if he controlled everything. We arrived at Calais at 1 ½ at night and went to the *Hôtel Meurice*.

Mond. Aug. 24th. The next morning we travelled with the steamship to Calais[24]. The landlord recommended a French ship that was to leave at 10 ½; the commissionaire for an English steam-ship came and recommended his, which was to depart at 10 o'clock. A commissionaire for the French ship came and assured us that we would still arrive in Dover earlier with his ship, which he said was bigger and

24. Dover, which Ørsted consistently spells "Dovre".

had better engines. However, we chose the English ship and crossed in 3 hours. The French had not arrived when we left on the railway a couple of hours later. We paid about 18 Shill. each to travel first-class to London, which is about 3 marks for each Danish mile. At the station everything proceeds with great calm, which is very different from the French noise, and yet everything went very quickly. We covered about 7 Danish miles per hour. I here renewed the experience that one even sees nearby things like poles in fences clearly in spite of the great speed. – When travelling by railway, one rarely sees beautiful regions because one always travels through hollows when there are hills. One mostly sees plains. We arrived at the *Sablonière*, Leicester Square at 7 o'clock.

Tuesd. Aug. 25th. We spent most of the morning calling on people in vain. We called in vain on Count Reventlow, Leg[ation] Sec[retary] Bjelke, Advocate Henderson. They were almost all out of town. However, we found Hambroe at home. He received us with great courtesy and invited us with our ladies to dinner at a time to be set later. We each received 20 pounds from our letter of credit, ate oysters for lunch, and came home a little before 4 o'clock. We then promenaded with our ladies in St. James Park, which is large and has a beautiful little lake with swans and other sea birds, even black swans. We walked around a large part of Green Park, looked into Hyde Park, which was too big to walk through this time, and went home along Piccadilly. After the meal we went to the Polytechnical Institution, which lies a long way out on Regents-Street, to see an exhibition of physical and mechanical instruments and experiments. It is difficult to imagine a worse confusion than the one we witnessed here. Almost all the time there was loud music along with a deafening noise of machines and human voices. The illumination was strong but so unwisely arranged that there were very many places (in the entire gallery) where it made things difficult to see. After the spectators had wandered around for a while, a lecture about the electromagnetic telegraph was announced. Everyone flocked to the gallery which had been indicated for this, but many had to leave again due to a lack of space, and among those who remained probably one quarter could not see or hear anything. Some of the things that were on display could be regarded as quite good in themselves,

e.g. a steam engine, an atmospheric railway[25], etc. The Savart experiment[26], where *abc* on both sides represents a sheet of water, looked very good, particularly when a light was placed inside it. There was a disorganised mixture of the creations of the most varied countries in all the realms of nature and art. In short, one was confused by the entire impression. In his New picture of London, Mugg says about the Adelaide Gallery, that it was first intended to show science and its applications, but when they found that this did not attract sufficiently many, they sought refuge in *meretricious aid*[27]. This strong expression for the degradation of science can certainly be applied here. – On the way out and home we saw the beautiful and gloriously illuminated shops in Regents-Street, which are not as tasteful as those in Paris but are still quite magnificent and characterized by large panes of plate glass that one rarely or never finds in Paris.

Wed. Aug. 26th. We found Leg. Sec. Bjelke at home. Count Reventlow had not come in. We also found Robert Brown at home. He received us most amiably and showed us, among other things, many specimens related to the anatomy of plants. While viewing these objects, there returned vividly to my mind the thought that has un-

25. An "atmospheric railway", where air pressure is used to provide the power for propulsion, between London and Croydon opened in January 1846.

26. In this experiment a vertical jet of water strikes a horizontal plate from below. The resulting sheet of water is known as a "water bell". This experiment was first performed by Savart in 1833.

27. In *Mogg's New Picture of London and Visitor's Guide to its Sights* (1844), Edward Mogg (active 1805-48) describes the The Royal Adelaide Gallery of Practical Science, Adelaide Street, Strand as follows: "Science alone, however, it was soon discovered, had not of itself attraction sufficient for the multitude, and a resort to meretricious aid was the consequence."

doubtedly also been stated by others in different contexts, that the beauty of Nature is a fundamental characteristic which does not exist merely for external observation but is present in the smallest, even microscopic, parts. As far as I remember, I have forgotten to emphasize this in the things I have written on beauty. All this hidden magnificence inside bodies can only reveal itself to Divine observation. We met there a Dr. Falconer, who has performed great geological investigations in the Himalayan Mountains and found several vanished animal species alive there and in the same places found the remains of them. He has brought back very many remains of the ancient fauna of those places. We also visited Dr. Konig, who lives at the museum. We called in vain on Horner, Children, Graham (the last two away) but met a Capt. Henderson. He confirmed to us that the screws for steam-ships are extremely advantageous. We then took our ladies about to show them something of the city. We walked through Regents Street to show them the very best boutiques in the daytime, through part of Oxford Street to show them one of the busiest areas, through a small part of St. Giles to show something of the poorest, to the Strand near St. Clemens Church in order to go home along the Strand to show them a heavily trafficked area, where there are also many beautiful boutiques.

Thursd. Aug. 27th. A visit from Court Councillor Hambroe in the morning. Called in vain on Svanberg. Found Babbage at home. He immediately invited me to breakfast on Sunday at 9½ and, when he heard that **Forchhammer** was here, invited him along. He asked me to tell him what foreigners I would propose to him to invite, and I named Svanberg and Matteucci, whom I undertook to invite myself. When I said that I was going to the Colosseum[28], he offered to walk part of the way with me; but when, after a few steps, he learned that Forchhammer, Mrs. Forchh. and Mathilde were there, he asked me to turn back and wait until he had posted a few letters. He then walked with me all the way there and accompanied us faithfully for 3 hours. The Colosseum contains several things, including a very

28. Exhibition hall (1827) in the southeast corner of Regent's Park, designed by Decimus Burton (1800-81) with a panorama of London (opened 1829) from the drawings of William Horner (1786?-1837).

large panorama of London. The painting is said to have an area of one acre. It depicts the view from St. Paul's, and consistent with this, one even sees the panorama tower at its proper distance from this church. The entire circle of views is extremely convincing. By climbing somewhat higher in the panorama tower, one sees a wider view such as is offered from a higher vantage in the tower of St. Paul's; even higher up one sees the real view from the place itself. This, however, is far from all. One finds here a variety of purposes united. In the lowest part one finds copies of the works of the finest English sculptors. One hears music from a most curiously constructed organ, finds on the entire lowest floor many tables for refreshments. The building is surrounded by a garden, which in a very narrow space gives a convincing imitation of something large. From the windows and from a very narrow space outside the building one sees a waterfall which really falls, as far as F. and I could estimate, from a height of 40 feet, but from the selected spot seemed much higher. On the same cliff we saw houses and a water mill which was driven by the falling water. A little farther along, a meadow could be seen. We were led through an underground cave, an imitation of the one in Adlersberg in the Tyrol. It was rather large. There one saw stalactites, underground springs, even a pool that looked like a lake. A proteus anguine[us][29], which is found in that cave, was shown in a glass cylinder. The play of the light gave the same green glow around the exit as the very first light of day gives in such a cave. On returning to the garden, we saw several ruins. Owls sat in the windows of some of them. One of the ruins looked like the ones at Pæstum. In a greenhouse we not only found beautiful plants, but it seemed as if it were larger than it was in reality as the apparent size was increased by mirrors. This is only a very short description of this very extensive establishment, which must have cost enormous sums but survives on admission tickets.

We then visited the zoological gardens. The animals here have far more space than in the Jardin de Plantes. We saw an excellent lion, in addition to several smaller ones, a pair of beautiful tigers, panthers, hyenas etc. We also saw bison, two elephants, of which

29. Non-pigmented man-fish.

one was very large. The smaller one carried people around in a rather magnificent procession. Furthermore, we saw a large camel, a rhinoceros, some giraffes, Angora goats etc. We also saw many strange birds, among them a number of black swans. Time forced us to leave much unseen and reserve it for another visit.

I saw a horizontal cylinder, made of iron rings, placed in the middle of an iron fence. Upon asking, I learned that it was to prevent rats from crossing. This enclosure had birds in it, whose eggs would otherwise be eaten by rats.

In order to prevent snails from getting to plants, which they wish to protect from them, they use a small fence some inches high, made of sheet zinc but with an upper edge of copper. As soon as the moist body of the snail touches both metals, it receives a galvanic shock which drives it back.

On Frid. Aug. 28th we visited the museum again. We saw the geological part of it, which contains many remains of prehistoric animals, and Forchhammer told us about many of these things. We also saw the Egyptian antiquities and, among them, a number of mummies. Among the curiosities was a woman's wig with such a mass of curls and dressed in such a style that one would think that it had been made in our time. It was joined at the top by a rather strong, shiny iron ring. Could this have belonged to an idol? Forchhammer introduced us to a Doctor Gray, a zoologist, who showed us the library and invited us to breakfast the next morning. In the library we met a Mr. Watts, who speaks many Scandinavian languages, including quite good Danish with a good pronunciation. In the evening we went to tea at Horner's, with Robert Brown, Sabine, Babbage, a young Mr. Prevo[s]t from Geneva, the grandson of Pierre Prevo[s]t, Dr. Falkoner and others. Among them was a Mistriss Smith, who had travelled a great deal in Germany and spoke with me for a long time.

Saturd. Aug. 29th. We ate breakfast with Gray, 8 ½ to 10 o'clock, then accompanied our ladies home, and went to the Polytechnical Institution. Here we saw the electric steam-engine, which was very powerful. It consists of a very large steam-boiler that is heated by an internal fire. The emitted steam goes through a cylinder that receives it through two fairly wide pipes and emits it through some twenty

narrow pipes, which stick out from the cylinder almost like ribs. Each of these pipes is equipped with a device of hard [wood], mentioned in the descriptions. The steam is emitted from all these orifices toward an instrument, equipped with iron spikes, which receives the positive electricity of the steam so that the machine retains its negative undiminished. The steam-engine stands on glass feet, which must be dried frequently. When all is working properly, it charges an elec. battery with 75 square feet of plates in 10 seconds. The melting of metal, sparks, etc. are on a large scale. The electric current from the machine ignites fine wood shavings and is said to ignite gunpowder, which, however, did not succeed this time. On this occasion we made the acquaintance of a Mr. Bachoffener, who is a popular teacher but not, they say, a very good scientist. At 12 o'clock I returned to Gray, who together with his wife took us to Greenwich (Mrs. Forchh., Mathilde and me). We made the beautiful journey down the Thames and had ample opportunity to enjoy the view of all the activity there. The departure was from Charing Cross, close to a beautiful suspension bridge, on a steam-ship that passed under Waterloo Bridge, Blackfriars Bridge, London Bridge. Along the way we saw, among countless other things both near and far, Westminster, Wellington's Monument, Nelson's Monument behind us, and we came past Somerset House, St. Pauls, The Monument (from London's great fire), Tower, Custom House, many docks, even more large warehouses, the shipyards at Deptford etc. We passed over the tunnel and saw its two entry towers. We were surrounded by other steam-ships and had a view of many a forest of masts. We landed at Greenwich and were taken by Gray to the observatory. Airy was not at home, but the observer, Rev. ... Main, showed us around most willingly. What particularly interested me was the meteorological observatory, which is connected with the magnetic observatory. A tall pole, with a screen above it and insulation beneath it, is connected by metal wires to a room beneath it containing electrical instruments. A dark rain cloud just happened to pass over us and produced a genuine thunder shower. The straw electrometers were in constant motion, and a device to permit conduction gave sparks, which, however, were so short that they were scarcely visible during the day. I here met Sir Will. Hammilton from Dublin. We were first introduced to one another

with the customary lack of clarity. But after H. had made enquiries to Gray, he treated me with great kindness. He first spoke of himself as a member of the Royal Society of Northern Antiquaries so that I took him for an antiquarian, but during the conversation I learned that he was the mathematician and astronomer in Dublin. He had just borrowed my *Recherches sur l'identité des forces électriques et chimiques* from a friend (Pritchard) in order to take the book with him to Dublin. He spoke to me about Gassiot's very large galvanic apparatus and invited me to see it the same evening. If I accepted the offer, he would postpone his departure for Dublin, which otherwise was to take place the same evening. I accepted the offer, which also included Forchhammer and our ladies. We went to Clapham Crescent, where Pritchard lives with Gassiot nearby, but Gassiot was not in town. His daughter invited us for dinner next Saturday, as we were unable to accept any earlier invitation. Pritchard invited us to come to him if Gassiot should be hindered. We thus made many new acquaintances merely by virtue of science.

I also want to mention that we were in the famous sailors' hospital before we left Greenwich, but we did not have the opportunity to visit the rooms; however, we did see a large hall, which was decorated with pictures of famous admirals and victorious sea battles.

[Added in the margin:] An unknown lady had Matheucci ask me to write my name and, if possible, some Danish words in a small album. I picked three verses from my *Airship*, where it is said that if we possessed perfect truth, we would also live in beauty, faith and holiness. I accompanied it with a translation and an explanation in a letter to Matteucci.

Sund. Aug. 30th. We ate breakfast with Babbage in order to hear him explain his calculating machine afterwards. I saw his older calculating machine, which was intended to calculate all kinds of tables using differences, when it was new. But it was never finished; later he devised an entirely new and far more perfect one. The government had supported him in the construction of the first and had spent 17,000 pounds to this end. He now wanted them to leave the first one unfinished and support him in constructing the new one. He declared that this would be so much more perfect and simpler that it would be an extravagance to complete the old one. They

have not been willing to embark on this. He has now worked for many years to complete the plans for this new machine and has invented a notation of his own for designating all the parts of the machine so that one can use this symbolic language to read the operation of every process and the concurrent position of all its parts. The machine will not only calculate tables but also solve all kinds of algebraic problems. The number of obstacles he has overcome is truly remarkable, but one must fear that it will never be finished. – He presented each of us with a small piece belonging to his older machine as a memento. He kept us with him from 9 ¾ to 2 o'clock and exhausted us thoroughly. Forchhammer and I then visited Wallich, who was very pleased with our visit. We then ate dinner with Henderson (a barrister) and there met Grove, whose galvanic battery is now so widely used. At Henderson's table we heard an anecdote which deserves to be remembered. When Cuvier died, the Devil tried to coax him to Hell, but as they approached the flames, Cuvier became more reluctant and finally declared that he did not want to in spite of the Devil's persistence. "Then I shall swallow you," said the Devil, but now Cuvier looked scornfully at him from head to toe and said, "No, my good fellow, you have horns on your forehead and hooves on your feet, you cannot eat meat;" and then the Devil had to give up. The anecdote is really significant, and therefore I have written it down. Reason swallows the Devil, the Devil does not swallow Reason.

Monday Aug. 31st. We visited Richmon[d] by omnibus. In the carriage we met an Englishman who was most obliging, and when we had got off, he accompanied us part of the way to the gardens. Richmon[d] is known as a very beautiful area, which we agreed with completely. We had a magnificent view from the balcony of a tavern called the *Star and Garter*. We had our Lundge [sic] here. Both Forchhammer and I noticed that the ale we had drunk, a pint each, had exerted an intoxicating effect on us. Indeed, we felt much invigorated and walked easily to Kew, which is about ½ Danish mile, but we felt some dizziness, and I slept a little in the omnibus that took us home; Forchhammer, who had chosen a seat outside, was refreshed by the air but still had the same feeling all the way. I have always found myself much invigorated after drinking ale but also

more than reasonably hot. This will induce me to be cautious. – Kew is a very large and beautiful botanic garden, but time allowed us to see only a small part of it.

A visit from Sabine. In the evening Henderson and his sister took us to the playhouse, the *Princess Theatre*, where we saw *The Merry Wives of Win[d]sor*, which was acted very well, and which would hardly seem so natural in Danish (I have not seen it in our theatre). Forchhammer and I found it striking that Falstaff and his comrades were so strongly reminiscent of Jacob von Tybo[30] and Christoffer Eisenfresser[31] even though Holberg has evidently not thought about Falstaff[32] when he created Jacob von Tybo. – We later saw *A Curious Case*, which was also played very well. Finally, they played *The Barber Bravo, Or, The Invention of Po[w]der*[33], which is set in Italy. It was an insignificant melodrama. – After the theatre we drank tea with the Hendersons. We had Assam tea, which is very good. Home at 1 o'clock.

Tuesd. Sept. 1st. Forchhammer and I paid several visits in the company of Prof. Svanberg but found only Lyel and his wife at home. They invited us for next Sunday, which was the first day for which we could accept an invitation. I then went for a stroll in Hyde Parc with Professor Svanberg. This park is very large and has a significant body of water, the Serpentine-River, which is not really a river but rather a long winding lake. A bridge even crosses it. We wandered through a good part of this garden but far from all of it. It has very large green fields but seems to me much too lacking in trees to be a comfortable haven for walkers, but one often drives there for pleasure. No hired carriage is allowed in here, that is to say, no carriage that looks as if it were hired. This seems illiberal, but if the opposite rule applied, traffic might well be too great. I spoke with Svandberg about electromagnetism and promised to explain my theory to him in detail. Mrs. Forchhammer and Mathilde were chopping [sic] for the entire day with two Misses Henderson and ate there. We received an invitation to become members of the

30. Title role in a comedy by Holberg (1723).

31. Character in Holberg's *Barselstuen* (1723).

32. Character in Shakespeare's *Merry Wives of Windsor* (1597?).

33. Two melodramas from 1846 by Thomas H. Reynoldson (1808?-88).

Athenæum club for two months. This is a distinction that is only conferred on 10 people at the same time.

Wednesd. Sept. 2nd. In the morning at 8½ for breakfast at Gray's, where Henrik Rose and his wife also were. Mrs. Forch. unwell. Mathilde stayed at home with her. Later I took Mathilde to the Elgin Marbles, which are housed at the museum along with other remarkable pieces of art. We saw the Rosette Stone, and I explained to Mathilde how its threefold inscription had given Dr. Thom. Young the first opportunity to read the hieroglyphs, which Champollion-Figeac had developed further. I heard that the many other Egyptian inscriptions to be found here and elsewhere mostly consist of prayers, monotonously repeated one place after another. One finds here ancient works of art from Egypt, Hetruria, Asia Minor, Greece, Rome; also some from India and Persepolis. Few of them are well-preserved, but in one or two things art has come to their aid. One finds here a model of the Parthenon as it was before Lord Elgin plundered it, and as it probably was when it was new. Almost all the figures belonging to the friezes are seriously damaged, and hardly one among them is complete, but it cannot be denied that all these things are important for the study and history of art. – I was at the Athenæum from 2 to 4 o'clock, ate at home with Mathilde (Mrs. Forch. ill, Prof. Forchh. with Philips). Strolled with Mathilde in St. James Parc.

Thursd. Sept. 3rd. With Mathilde and Forchhammer to Hare Court, where Henderson and Grove have their office, and were taken by them to the Temple Church, which has belonged to the Templars and has a quite remarkable architecture. It was in disrepair, but a great deal has been spent on its restoration. It will soon be finished now. We here repeated the observation that, in the midst of the noisiest parts of London, one can often enjoy perfect peace and quiet because one finds courts and gardens that are quite separate from all the rest. We then visited a very large brewery in Smithfields Finsbury. It belongs to Hamburry, Buxton & Comp.[34] A young, and

34. Ørsted leaves a large space before "Hamburry". The brewery in question is Truman, Hanbury, Buxton & Co. Founded in 1666 in Brick Lane, it is mentioned in *David Copperfield*.

apparently very able, chemist Henry is the brewery's chemist. [Added in the margin: In his little library one found books in German, French, Italian, and among them historical works and poetry.] He showed us around. Naturally, there were many peculiarities in the construction: In the main it greatly resembled the largest one that I saw here 23 years ago. Here I saw again what I saw in several places the first time I was in London, stairs of thin open-work iron plates and many places with floors and ceilings similarly made. This leads to a very free circulation of air throughout the building, which is often very desirable, and in such a large brewery, where so much carbon dioxide is liberated, it must be important. Might this distribution of air currents result in one not feeling a draft anywhere? The brown malt for stout gives it its taste and aroma, but one also adds a black, almost charred malt, which gives it the dark colour. – The size of the establishment is enormous. I hesitate to give numbers on the basis of cursory oral reports. It has its own workshops for the repair of the machines and other parts of the establishment. In one of the workshops they made signs for those dealers who purchase all their beer from them with the name of the brewery on them and "entire", which means that the sale of all beer at that place is exclusively based on this brewery. One finds the same thing for other large breweries. – The stables of the brewery contain 120 horses, which are very big, and which cost 70 pounds each on average.

At Sabine's invitation F. and I dined at the Royal Soc. Club (in the *Crown and Anchor*). As the Society is not holding meetings at this time, and most members are absent, the party was very small. Ansted and Grove were there and Schönbein as a guest.

In the evening Forchhammer, Mathilde and I went to Horner's. We found Rob. Brown, Murchison, Babbage, Lyel, Prevost, Svanberg there. The ladies of the house and Mrs. Lyell are very cultivated.

Friday Sept. 4th. We paid a farewell visit to the Hendersons, made several other visits in vain but did meet Richard Philips, from whom we obtained some information about the waterworks here. I received a very kind letter from Whewell with an invitation to Northern England together with Mathilde. I had to say no. I did some work at home. Dinner at Murchison's with Sabine, Brown,

Rose, Middendorff and others. The lady of the house, Mrs. Sabine and Mathilde were the only ladies present (Mrs. Forch. ill). The meal was exquisite and Murchison a most attentive host. When he proposed toasts to the guests, he proposed mine very particularly, to which I responded that I thanked him for this honour. I had been pleased to notice that even though I had lost many dear friends since I was last here, I could see that English hospitality and English love were undiminished if not increased. I acquired a good deal of information from the conversations.

Saturd. Sept. 5th. Visited John Taylor, who gave us a good deal of information about the waterworks. The very best is said to be in Nottingham. He referred us to Parliamentary Reports. Otherwise, I mostly worked at home. Dinner at Gassiot's along with Grove, Pritchard and his wife; Mathilde was there. Grove wanted to deny deviation during a fall (also the one toward the east), but he revealed that he knew nothing of the investigations. Pritchard knew them. Gassiot showed us his experiments. The one with a water battery of 3000 (if I remember correctly) was very beautiful and simple. Two very thin, here vertical, condenser plates stood immediately opposite one another and could be moved away from or closer to one another. They were scarcely 1/10 of a line apart when the spark jumped across, but then there was a succession of sparks that shook the thin condenser plates so that they made a sound. – **Grove's** gas- and water-battery[35] was also demonstrated. Furthermore, the large **Grove** battery of 100 pairs was shown. The platina plates of each element are only 8 sq. inches. The glare was blinding. We were equipped with dark glass to look at it. He melted thick metal wires, especially copper wire, which fell in large drops into a bowl of water, where they even stuck together. He gave us a sample of the resulting mass. I made the observation that one must be able to make practical use of this for the melting of platina, which Grove confirmed.

[The following paragraph has been added in the margin:] Some hasty prismatic experiments were performed, in which various curious stripes could be seen, of the same nature as Frauenhofer's. It

35. Grove's gas voltaic battery (1843) was the first fuel cell.

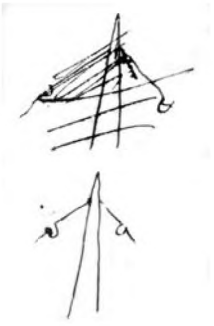
was undoubtedly the generated gases and not the glowing bodies that caused it. Would a platina wire, made to glow by the battery, not yield such stripes when regarded as a line of light, give them when the light is scattered in the direction of the length of the wire? It should preferably be small.

Faraday's new experiment was demonstrated. Gassiot had a beautiful piece of Faraday's own glass. The experiment was clear enough, due to the great power, but not instructively performed. – He had invited Faraday and received a letter according to which he said that he would visit me on Monday.

S. the 6th I did not feel well (some colic) and worked at home. In the evening we were at Lyell's along with Rob. Brown, Babbage, Prevo[s]t, Svanberg, and others.

M. the 7th we went to Kew with the best introductions, which, however, came very close to being useless. We were to see the meteorological observatory and to visit the botanist Sir Will Hooker, but they had forgotten to tell us that although the observatory is at Kew, it is not in the botanical gardens but on the other side. The porter at the entrance to Kew knew nothing about an observatory but, after some talking back and forth, took us to a Mr. Smith, who helped us. He left his midday meal to show us the right way. We learned from him that the observatory was 1 ½ (perhaps 2) Engl. miles away, but he gave us a man to accompany us through the gardens and let us out at a place from which we could see the observatory. F., Mrs. F. and Math. remained in the gardens, which they rightly feared there would not be time for if they were to see the observatory after our mistake. As for me, I had to give up seeing more of the gardens than I had seen the last time and now on our walk through it. We then parted to meet again in London. I had to wander across a very wide grassy plain before I arrived at the observatory. A thunder storm was brewing. I just managed to reach the observatory so that I arrived dry. Ronalds, to whom Sabine had written about me, received me amiably. Another Ronalds, his nephew, and Mr. Hudson, whom I had seen at Gassiot's, were also there. The observatory is excellent and has many of Ronalds's own inventions. The meteorological observatory proper is in a round dome raised above the house with an opening in the top, through which a brass rod is extended. It has a

pointed end with a screen beneath it. The rod itself is fastened to an insulator. This is a hollow glass cone, inside which is placed a hollow metal cone, which, however, does not touch it at any point. At the mouth of this metal cone is a burning lamp which keeps it warm. Thereby the glass cone is warmed, more at the bottom than at the top. Thus, there is always a belt on the glass which has the temperature at which it insulates best. Several arms extend from the lowest part of the insulated conductor. A brass rod with a ball descends from one of these, and under this ascends an uninsulated rod which can be brought as close as one chooses. The distance is adjusted by means of a device that permits the most precise measurement. At two of the arms the caps of two Voltaic straw electrometers are hung so that they do not touch the glasses in which the measurements are made. One of the two electrometers indicates degrees, which mean a certain *n* times larger strength than the degrees in the other. On another arm there was a quadrant electrometer. Whether its electricity is positive or negative is determined by a gold-leaf electrometer, whose upper part is a tube that constitutes a Leyden jar which is very weakly charged. This can retain its elec. for an entire day; one merely brings this electrometer a little closer to the quadrant electrometer to see from the leaves whether both have the same or the opposite electricity. They also had an electromagnetic multiplier, for the time being it seemed merely to serve to show the current produced by a series of sparks. A thunder storm hovered over us. Nothing could have been more convenient for this visit. I saw considerable sparks, certainly ½ inch, fly out. When the rain came, the electricity naturally became weaker. The electricity changed when the rain came. It has just occurred to me that the screen should have



a gutter in which the water could be held for a few minutes after the rain had begun to fall. The adjoining figure gives a suggestion of the thing. One would hereby see the effect of the rain before the insulation was strongly interrupted. He registers his electric, magnetic, barometric, thermometric observations photographically. For the sake of brevity I must pass over many things as I can see them in a treatise that I shall get. – He expressed the opinion that Ampere's solenoid would perhaps be very useful for detecting electrical currents in the air. – Hudson had his own carriage, in which he drove me to Pultnay [Putney], close to which there is a station for omnibuses. I got almost to Leicester Square in one of them. The others arrived only so much ahead of me that I saw them go through the door.

Tuesd. Septemb. 8th. We visited **St. Paul's** Church. There was a service, but this occupied only a small part of the church. The singing was beautiful, the chanting too, but the prayers went at a gallop. We walked around in the church as much as we could. The impression of the whole is great and magnificent. He[36] lies buried underneath the organ. The inscription on his grave is well known. It says that he was the builder of the church and of the city and lived for more than 90 years, not for himself but for the common good: Reader, if you seek his monument, look around you. I had tears in my eyes from seeing this praise for that magnificent man. A large part of the church is fenced off by bars with iron spikes. One is not allowed inside these for the duration of the service. Then this space stands completely empty. It is obviously a horrible thought thus to close off a part of this beautiful church. We could still see many memorials clearly enough to have an impression of how England honours her great warriors and statesmen. Its scholars as such rarely receive such honour. We were particularly pleased by the magnificent impression of the entire church. We did not take the time to go up in the famous *whispering gallerie*, which is only an insignificant accident in this work of art.

We then went to the Bank. There we saw an interesting way to line paper. Straws, which could be aligned in a suitable device, were

36. Christopher Wren (1632-1723).

equipped with small pens and placed against a roller, coated with cinnamon. This roller was given the colour that ran from there down to the pens and gave paper, which was passed underneath, lines with a fixed distance. We also saw the printing of paper on both sides (which is no longer new). – Steam-engines below are connected to a device above, where the bank notes are printed. For each kind of bank note they have such a device, which continuously indicates the number of each kind of bank note that has been printed at that moment. Each hundred printed notes is brought out through an opening, from which come a hundred new sheets of paper for printing. They have a mechanism for the weighing of the gold coins received, which tests them piece by piece and immediately casts to one side (into a box) the coins of full weight, those that are too light to the other. As it is here only a matter of full weight or not full weight, this goes very quickly. As far as I know, each coin is blown away with air from an air pump below, driven by a steam-engine. I do not have the time to describe all the wonderful devices that make everything go like clock-work. In the part of the bank where the new notes are kept, they let us hold a package that only weighed thirty odd pounds and contained 1 ½ million pounds sterling. This bank is certainly the place in the world where the greatest number of financial transactions are done.

We drove from there to the tunnel[37]. Although it has been described so often, it still makes an unexpected impression. The ramp has not yet been built; it is said to be very expensive to make. One walks down flights of stairs, which have many places to rest, and we walked all the way through it. It is divided into two passages, between which there are connections. It is illuminated with gas and contains a number of boutiques in which one finds pictures of the tunnel and many of the over-ground parts of the city. One also finds many other small things and articles of food for sale there. It must be very unhealthy to have one's place of business down here and stay here all day long. – From here we (Mrs. F., Math. and I) sailed on a steam-ship up the Thames: I to Somerset House, Mrs. F and

37. The Thames Tunnel, between Rotherhithe and Wapping, begun in 1825 and opened for pedestrians in 1843, was the world's first underwater tunnel.

M. to Hungerford Market. – Wheatstone had told me to meet him at King's College in Somerset House, he wanted to show me and some others the collection of physical instruments, but the keys and those who should have them were not present. So, we saw only a few things that I shall not mention as they merely reminded me of things which I had already seen described. Wheatstone then walked with me. It was my intention to go to Abingdon Street, where the printed Parliamentary Reports are sold, but he took me to various places along the way so that it was too late. In passing, he took me to a daguerreotypist, Claude, who asked me if he might take my picture. This went very quickly even though it was late in the afternoon. He took 4 portraits, one right after the other, and gave me one of them. It is unquestionably the best likeness of any of the daguerreotype pictures of me. Something stiff and unfamiliar cannot be avoided.

He also took me to R. Hunt, whom I had already seen before. He gave me a little dissertation on the effects of magnetism on crystallization.

Wednesd. Sept. 9th. I was in Faraday's laboratory at 8 o'clock. He was not present, but an aged preparator, who was not very bright, showed us the large electromagnet in the shape of a horseshoe with which he has performed his most recent experiments. Its cross-section is a square, rounded at the corners, with sides of about 3 inches. It is wound 5 times with copper wire of about 1/8 inch diameter. It is said to have been made from an anchor. 10 Grove elements were sufficient for its full strength.

At 1 ½ we departed for the 2 ½ hour journey to Southhampton and went to stay at Portswood House, a little more than one English mile from the town, with a rich and cultured family, Mr. George Jones.

Thursday Sept. 10th. The first section meetings. There was little of interest in the physical section. Powell gave a good oral presentation of what one can say about the stripes that Brewster has found in light under certain conditions. A Mr. Laming read an unreasonably long dissertation on the formation of bodies from 3 kinds of atoms. In the evening the first large general meeting was held. The most important officials of the Society and the most distinguished guests had seats on a separate platform. Herschel first made a short

speech, as last year's President, then Murchison a much longer one. After these, Lord Palmerston made a speech in which he proposed thanks to Murchison. He spoke, apparently without preparation, about the great influence of science on the well-being of mankind and impressed on the citizens of Southhampton the honour and benefit that they could reap from the meeting. It seems that they are in great need of such encouragements. The Marquis of Northhampton, President of the Roy. Soc., made a good and witty speech in support of Murchison's proposal. Prince Albert was also present. All the speakers made a great fuss about the fact that he attended these gatherings for the first time and had been nominated as the only honorary member of the Society. I was presented to him after the meeting. After the first exchange, he seemed to be at a loss for things to say. Therefore, I said that it would be a very pleasant memory for me to have had the honour of speaking with him here. He then enquired about the King's health, about which I could give him favourable news. I was also presented to the Marquis of Nor[th]hampton. I also became acquainted with an Under-secretary in the Foreign Department, where Palmerston is the Secretary, as Minister for Foreign Affairs.

Friday Septemb. 11th. In the mathematico-physical section. Here I heard a Mr. Stokes deliver a report on the latest discoveries in hydrodynamics. It dealt almost entirely with wave motion, but he gave a very clear presentation of the line of thought in the most important recent works on the subject. Herschel rightly praised this report and made the observation that mathematicians who did not make their own study of these subjects had great difficulty in finding the truth of the matter in the midst of all the calculations. Both he and Whewel often said something similar about mathematical optics. – Challis informed the section that, again this year, he was unable to make a report on astronomy, and he was permitted to give one next year. Finally, a dissertation was read on atmospheric pressure, wind changes etc. in Bombay. The author was unaware of Dove's work on this. I had to take the presidential chair for Herschel during the last part as he had to go to another committee.

Dinner at Gassiot's with Matteucci, Svanberg, Wheatstone, Pritchard, Grove, Ronalds, two Twinings, and others.

A general meeting in the evening. Owen, Buckland, Lyell, Buller and others spoke. I only heard Lyell and Buller, who were closest to me, quite well but lost much of what was said by the others.

Before going to Gassiot, I took a walk with Herschel, where I explained to him my proposal for new experiments regarding the fall of objects from very great heights. He strongly advised me to present it.

Saturd. Sept. 12th. Wrote part of my letter to Herschel about deviations from the line of fall. Then in the physical section. A walk with Wheatstone to the harbour and to the electron. telegraph. In the evening in the conversation-room. In the morning, Wheatstone had introduced me to Scoresby, who looks very young for his age. I continued the acquaintance in the evening. On Tuesday he will demonstrate some remarkable experiments on the amplification of magnetism. In the conversation-room I met Colonel Colby, who, when introduced to me, used the most flattering expressions. I reminded him that we are old acquaintances from 1823, and I reminded him of several details from our conversation, which he had forgotten. His wife was there and a son, who was said to speak German, and was going to become a scientist. He seemed to me to be simple-minded, but that may have been bashfulness. Today Mathilde had participated with Mrs. F and F. in a tour of the Isle of Wight and had not only enjoyed the beautiful scenery but was also pleased with all the courtesy she had encountered, even from people she had not seen before.

Sunday Sept. 13th. I was in one of the churches of the town with Mr. Jones. The singing was well led by some strong and practised voices; otherwise, the service was very formal, long and tiring. A great many prescribed prayers were read, filling more than an hour, I think. They smacked of the darkest ages. There was more Jewish than Christian spirit in them. In one of them he prayed to defeat their enemies and to let them, the worshippers or at least their nation, tread in the blood of their enemies. With every prayer, one had to kneel down and hold one's hands in front of one's eyes; with every song, with which the readings were interrupted, one had to stand. Passages were read from the Prophets and from the New Testament, which were all very far from having any moral significance. I first heard a prophetic threat against the Jews, then the story of

John the Baptist's execution, then the story of the feeding of 3000 men, then of Christ's walking on water, etc. The entire creed (if I remember correctly, the Apostles' Creed was read twice) [and] the Lord's Prayer were read even more often than we do but clashed terribly with all the long prayers that Christ liked so little. I cannot understand how anyone who has taken counsel with Christ, through his words and deeds, can believe that there is any Christian spirit in all this literalism. It is remarkable that people can do this with so much apparent devotion. The sermon was of no significance. It dealt with the words: "And because I tell you the truth, ye believe me not." He twisted this so that he concluded that people had a particular tendency to reject the truths of the Church. He played the martyrs of the English church as trump cards without thinking that even in those times of bloody religious strife, men of very different creeds sealed their beliefs with their blood.

A dinner party here at Mr. Jones'. Among others, Murchison, Wheatstone, Murray the publisher, Mories Stirling ... . The party was very lively, and I think that everyone was satisfied with it. I made a closer acquaintance with Murray and may get him as the publisher of my dissertations and dialogues. If only there were not so many left to write!

Mond. Septemb. 14th. I was first in the math.-phys., then in the chemical section, where Grove read my report on the changes in mercury due to glass. It was the first time that I was there, and I was received with excellent applause. There were several comments to which I responded competently, as far as I can judge. I went back to math.-phys., spoke with Herschel, strolled with Wheatstone and ate with him in one of the taverns of the town. Here we met Eisenlohr, and I made the acquaintance of Eaton Hodghinson from Manchester, who has written on the strength of bodies. In the evening I heard Lyel's lecture on his geological investigations in America. Dr. Buckland, a Mr. Bullar and others spoke on that occasion. I was not favourably seated to hear everything.

Tuesd. Sept. 15th. My letter to Sir John Herschel was read in the phys. section by Mr. Stokes. It was not much discussed as I had avoided everything controversial. Therefore I only gave some information that was intended to prove that the letter did not presume

any new theory but only suggested new experiments to settle doubts. Today was the big dinner. I sat between Murchison and Herschel. It is a pity that the latter hears so poorly and does not speak clearly either as he has lost a number of teeth. I value him highly. The dinner began in great confusion. They had, among other things, completely forgotten the wine so that it came only after a couple of courses had been eaten. Murchison, with great feeling, proposed toasts to the Queen and Prince Albert, which were drunk with much approval. Murchison also proposed a toast to the foreign scientists and emphasized me particularly. I responded: In this moment, where I shall have the honour to express not only my own thanks but those of so many learned friends, I feel me-self troubled on reflecting upon my want of habitude of speeking the language of this happy country, but the kindness of which I have constan[t]ly received the most gratifying marks r[e]assures me, and let me hope your forbearenc[e]. The sentiments, I shall express, require no art of eloquence. We are all penetrated of the most friend[l]y and gratefull feelings of the kindness we here have met with. We shall bring to our different homes, in distant countries, the much pleasing recollections. These will not only originate from the pleasures, mental and social, which we have enyoied [sic] here, but at the same time spring from the still higher feelings of general humanity. We, I mean all scientific men and friends of science, have one great work in common, the promotion of science and the improvement of the human mind. You have kin[d]ly invited us to your association, already distinguished by high merits of science, and you have received us as partakers in your liverly [sic] meetings. We thank you as benevolent friends, we give you our hands as breath[re]n, we promet [sic] you as good allies to work with you for our great purpose the promotion of s[c]ience and the improv[e]ment of the human mind.

After dinner there was a public meeting, where Grove lectured first on Schönbein's latest discovery and then on his own. He showed the experiment with Schönbein's combustible cotton and then demonstrated his own discovery of the dissociation of water by means of heat alone.

Wednesday Sept. 16th. In the morning I, along with Mrs. F. and Mathilde, made a journey to Bisho[p]stoke and Winchester. Dr.

Garnier, the Dean of Winchester, has a very famous garden there, to which he invited me and my party. We were very well received. He himself showed us around this magnificent garden, which Herschel has rightly called a paradise. It is rich in very beautiful trees and flowers, which are admirably grouped, and is characterized by the most careful cultivation. The grounds have a desirable variety and provide magnificent views. In Winchester we saw the old and very large cathedral, which is associated with so many parts of English history. It made an powerful impression but is far from being as artistically built as the one in Köln.

We ate at home with the Jones family since it was our last day. In order to fulfil the family's wish concerning this, we readily declined a dinner given by the Mayor of Southhampton, Mr. Lobb, who that day gave a splendid banquet, to which the Marquis of Northhampton and the other most distinguished members of the Association were invited.

In the evening we attended the final meeting. Reports on this can be found in our papers, which have excerpted them from the English ones. The report on my speech is somewhat incomplete and somewhat imprecise. Since I could not foresee that I should speak this evening and only on arrival received a hint about this from the Secretary, Colonel Sabine, and even without any suggestion of the occasion, I could only respond briefly; however, I did have a little time to think it over during Herschel's speech. As I remember it, my speech was the following: Though I have received so much honour and kindness here, this new honour, conferred upon me by the praise given me by a man, whom I have admired before I knew him and loved as a friend, having been acquainted with him, overpowers me with feelings, which augment the difficulty of speaking a language, to which I am so little accustomed. I have certainly not neglected this excellent language, but in contrary studied it from the best authors, and taken a true delight in your great poets and your prose writers disting[ui]shed by the manly clearness of their style; but I have lived to[o] short a time in this country that I have not obtained sufficient ease in speaking as to enable me to address such an audience. I consider the honour I have received here, not only as a high person[a]l gratification, but it calls fort[h] in me feelings of a

still higher order, in turning my mind upon acknowledg[e]ment, w[h]ich science now finds in all countries, and in these days has received here in an so eminent degree. England having produced so many prominent men of science, among which the name of Newton, the great author of the m[o]st fundamental theories, makes a long enumeration of so many other names superfluous, has the greatest reason of lo[v]ing science, which has given her so much honour; and as science is power it has an other great reason to the same feelings having derived so much power from science; for true it is science now pervades all the practical pu[r]suits, and that men of the lowest and least instructed classes, having no idea of science, apply its precepts. This evening has intensely turned my mind upon the happy progresses of science and acknowledgement of science, which every day becomes more general throughout the world. We foreign visitors of your association, concur[r]ing with you to promote this acknowledgement, present our warmest thanks; and I feel me-self glad and proud of being among the priests of this sanctuary.

My journal from England ended with the events of this day, and I have had to write this in Copenhagen. The expressions may thus have been changed a little here and there and are perhaps a little better than the ones I used, but I am certain that the sense has been preserved. It has not been quite properly understood by the English journalists, which was difficult as the discussions here were so different from the ones that they are used to reporting.

I shall now end my journal in all brevity.

Thurs. Sept. 17th. Today we said farewell to the Jones family with mutual feelings of friendship and regret about the separation. By invitation we went on the railway to Portsmouth. The fares of the foreign guests were paid for them. We were taken to 2 war ships in the harbour; one *the Excellent*, the other the *Victory*. The former is a training ship, where the seamen receive all kinds of instruction. They showed us everything; among other things, they took us below deck and practised gunnery in our presence. The confidence with which everything was carried out was remarkable. They moved the cannon, loaded them, aimed them, and fired them with the greatest speed and hit their targets very well with the balls. Everything was done with the same zeal as if it were a battle. The ladies

covered their ears; some of them even felt too strongly shaken, but there were not many complaints from them. – The *Victory* is the ship on which Nelson fell. The commander-in-chief is still the man who, as a lieutenant, raised the flag to start the battle. The place where Nelson fell was marked. They also showed us the little room in which he died. We also saw his bedroom. We were taken to the Admiralty and into the commanding admiral's garden, where they played delightful music. In a large hall we found a table set with richness and taste. Naturally, it was intended for the invited guests, but so many other members of the Association and their wives had crowded in that we had to be divided into 3 groups and refresh ourselves a little in the greatest haste. We were then taken to the large workshops, where we spent some hours. It was most interesting but too tiring and benumbing because everything was pressed into such a short time. Even though I recall much of it, it would be too extensive and difficult to give a summary of it here.

At 5 ½ we left on the railway for London, where we had a meal in the evening and then went to a most necessary rest.

Frid. Sept. 18th. In the morning from 10 to 12 o'clock I was with Faraday, who showed me his new experiments. They have all been publicly described, but it was very instructive for me to see how he performed the experiments. The instruments were very simple but powerful, the effects large and, if I may say so, tangible.

We were invited for dinner (5 o'clock) by Dr. Plaifair, who lives 5 or 6 miles from Leicester Square, outside London on the road to Richmond. He is newly married and had a party at his house for the first time. The company was very pleasant. We drove from there to Gassiot, some more English miles. Here a large party had been invited to meet with us foreigners and to see his apparatus and experiments, which were excellent, but which I had already seen.

We left there at 10 o'clock, fetched our bags etc., and drove to the steam-ship near Tower-Hill. It was to sail at 1 o'clock but was delayed for 4 hours by fog so that part of the morning was spent on the Thames. We had the most beautiful, calm weather on the entire journey so that I did not feel that I was at sea.

We spent Saturday, Sunday and Monday morning on the water. The tide in the Elbe delayed us somewhat. We only arrived in Ham-

burg at around 4 o'clock (Monday Sept. 21st) and were too late to depart on the railway to Kiel the same day. – After we had eaten, we took a walk partly through some of the streets of the city, partly and mostly around the basin of the Alster. The large buildings which have now been built around there look most impressive. However, it seems to me that there is so much disharmony between the houses and even in many individual buildings so little quiet accord that the total impression does not quite match the grandeur. My judgement, however, may be one-sided.

Tuesd. Sept. 22nd. We travelled on the railway to Kiel. With all of the complications naturally involved in leaving the railway and reaching our abode, we were not settled in Hauch's house until around 12 o'clock, so it was too late to go to the section meetings. We did, however, eat at the Society's table and went to a park in the evening. I became acquainted with Privy Councillor Mencke, the doctor of the spa at Pyrmont, with Professor **Himly** and others. At table, **Himly** had proposed an ambiguous political toast for "the twilight", which he tried to explain to me in the most favourable terms. However, everything betrayed his deep engagement in political passions. I told him that I did not want to involve myself in political disputes, but that I believed that every political toast or other political manifestation should be kept strictly away from the Society of Natural Scientists. In the evening a concert. A large biblical symphonic poem, **Paulus** by Felix Mendelsohn[38]. The text was a poor collection of biblical passages and bits of hymns, the performance benumbing and imperfect.

On Wednesd. Sept. 23rd I was in the physical section, where, with great courtesy, I was obliged to preside. Munck of Rosenskjold gave an extensive description of an electric multiplier. I reported my proposal, made in the British Association, for new experiments concerning the deviation of falling bodies. Many remarks were made, among other things about the measurement of time. Among these was a description, given by Lieut. Kauffmann, of an instrument made in Copenhagen, of which there is no mention in the daily reports of the Society. A man I did not know stated that the

38. An oratorio (1836) by Felix Mendelsohn Bartholdy (1809-47).

larger mass of the equatorial regions could draw the falling body away from the poles. I said that this would apply even more to the interior of the earth, which is far denser than the exterior, but that I doubted that a mathematical investigation would assign any effect to all this. Under these circumstances, it would affect the plumb line just as much as the line of fall.

After the meal we visited a pleasure garden, where I had a long conversation with Chalybæus, which pleased me very much. In the evening there was a so-called reunion, where there was dancing until 12 o'clock. I was among the spectators and received many demonstrations of kindness. I saw many old friends there, Rist among several.

Thursd. Sept. 24th. Final public meeting. I gave a lecture on the consubstantiality of the faculty of cognition throughout the world. Following the wish of the President, I had to express myself more briefly than had been my intention. So far as I myself can judge, I gave the lecture quite competently.

At noon, the great farewell banquet, moderately well attended and badly managed by the otherwise honourable Scherk (Michaelis was with a deputation to the King). I have written a supplement in German about this banquet.[39]

Friday Sept. 25th. Dinner at Privy Councillor Höpp's with, among others, Pfaff, who proposed a very beautiful toast to me, for which I thanked him warmly. Hauch proposed an equally excellent toast to Pfaff.

Saturday Sept. 26th. Leave-taking. Departure on the steam-ship at 8 o'clock.

Sunday Sept. 27th. After a safe journey, arrived home, where all was well.

[In the margin: To the journal, p. 88.] Some after-dinner speeches at the meeting of the German Society of Natural Scientists and Physicians in Kiel, Sept. 24th 1846.

During the above-mentioned banquet the Scandinavian natural scientists were on the whole treated as if they had forced their way into a meeting that ought to be purely German, even though it is

39. See below.

certain that we had been expressly invited, and that the gathering, like all previous German gatherings for natural scientists, was to be purely scientific, without any political interference. Occurring at such a scientific meeting, the way we saw ourselves treated was so extraordinary that, on the same evening, I wrote down what had happened and read it aloud to those present in Professor Hauch's house, where I was staying, in order to find out from the other participants present whether I had misunderstood something. It turned out that this was not the case in any significant way, although I received and have made use of some well-intentioned corrections regarding several details.

It seemed to me that a toast could reasonably be expected for the University of Kiel, which had contributed so much to the celebration, and that this would gain in interest if it were to come from one of the Scandinavian members. I still remembered the well-intentioned enthusiasm which greeted a similar toast that I proposed at the Scandinavian Meeting of Natural Scientists in Christiania to the university there. I announced my intention before dinner to the acting chairman, Professor Scherk, who not only granted the request but made it the first toast, which I had certainly not expected. My speech was the following:

> "I have the honour of proposing a toast to the University of Kiel. I am completely convinced that everyone present will join me in this; not only those who are present but also thousands who are absent cherish the same wish. It gives me particular satisfaction that I can confidently bring the same wishes from the University of Copenhagen. I can personally testify that it always pleased me when something occurred that benefited the activities and the support of the University of Kiel; and I know that I am not alone in this. – The University of Kiel has always had among its teachers excellent men who have performed significant services to the sciences and students who did it great credit. Long live the University of Kiel!"

There was no response to this, and perhaps no response was possible because Professor Hegewisch proposed a new toast to Germany with particular zeal. Naturally, I cannot reproduce this speech and

the ones which were made afterwards in such precise detail as my own, but I am convinced that I correctly reproduce what matters here. He spoke about the extent of the German coast from Kiel to Mehmel[40] and reminded us how this land had produced great men like Kant, Fichte, Herder, among whom he also counted Blücher, whom he called by the old name of General Vorwärts[41], and said that he had been born so close to the coast that it might as well have been in Kiel. He mentioned **Claudius** from Holstein, who had written the best German song about Rhenish wine. Germany, he said, stretched from the Rhine to the Baltic. He spoke about Achen as the location of the next meeting and recalled Charlemagne. In a raised voice, he wished good luck to the beloved and esteemed friends who were now going to the **South**. He placed special emphasis on the word South. It could be felt throughout his talk that he regarded the non-Germans as not belonging to the Society. At the end he relented a little and proposed a toast to Germany. As this was the result, I and other Danish friends felt compelled to join in and hoped that Hegewisch's hostile manner, in violation of all hospitality, would arouse general disapproval; but it remained partial, only expressed between neighbours.

Now Professor Forchhammer from Kiel stood up and proposed a toast to the University of Copenhagen, not a frank one inspired by pure goodwill but rather an ambiguous one. In his long speech he said that the University of Copenhagen owed its origin to Germany, which he will hardly be able to prove completely. He said that the University of Copenhagen had followed Germany, and that one could wish that it would not distance itself from it. With regard to the natural sciences, which are of a cosmopolitan nature, this closeness still exists but not with regard to the other sciences. He said that the University of Copenhagen was greater than Kiel with regard to external means, but that they would only deal with us on equal terms. He forgot to mention the scientific merits of the University of Copenhagen. –

To this I replied:

40. Memel, today Klaipeda in Lithuania, previously part of East Prussia.
41. General Forward.

> "I thank you in the name of the University of Copenhagen, but on this occasion I feel obliged to say that the Danish university and Danish literature, indeed that of all the Scandinavian countries, are intimately tied to the German and to no other in the same degree. We hope that the natural brotherhood which has hitherto existed between these two bodies of literature will remain undisturbed by political strife. However, we make use of German literature in accordance with our own character. If one is not satisfied with this but demands that we abandon our own character and become German, the demand would be very much in vain."

It was natural that I said this with noticeable warmth, but I believe that these words so clearly arose from national recognition and goodwill that they should have had a conciliatory effect; but no applause expressed disapproval of the inhospitable insults that we Scandinavian participants had experienced. It is clear that such applause should not have depended on the oratorical merits of the response.

In a beautiful, thoroughly humanitarian speech, Professor Jessen then proposed a toast to the Copenhagen professors Forchhammer, Steenstrup and myself, in which he included all true Danes; but this speech, which under different circumstances would have been an honour for us, gave almost the opposite of satisfaction precisely because of the great care with which he spoke. In particular, it lacked the true satisfaction of thanks to all Scandinavian participants, Danes, Swedes, Norwegians, several of whom had taken an active part in the work of the Society. One could not demand these thanks from Jessen; but the Society owed it to us, and the fact that it was absent was rudeness under the existing circumstances.

In spite of the personal goodwill of which I received many individual proofs, I leave Kiel with painful feelings, far different from those with which I came. I see not only the great distance between public hospitality here and that which foreigners always find in the British Society of Natural Scientists, and that which I have encountered in other German meetings, but I even see that science is no longer a shield against insults encouraged by political blindness.

I want to mention that at the end of the banquet the acting chairman announced that he was no longer chairman but Professor

Scherk, and as such, he invited us to coffee in the Keusenroth Park. I and several Danish friends were satisfied to be able to withdraw without offence.

Kiel, Sept. 25th 1846

Postscript. After all the declarations that I received yesterday from well-intentioned men, it is clear to me that a thoroughly pathological hatred of Danes reigns here, and that it is so blind and unrestrained that people have been forced to refrain from greeting the Danish natural scientists in the manner demanded by hospitality for fear of an unpleasant scene.

Kiel, Sept. 26th 1846 *H. C. Ørsted.*

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